Let's Have the Facts

THERE is a halt and hitch in the administration of the New Deal—What is the matter? What's retarding the progress of the New Deal? Whatever it is, the holdup is plainly manifest to all business men.

Senator Borah seems to think that the nigger in the wood pile is "monopoly." He is quoted in some recent press notices as saying: "The basic purpose of the New Deal is to increase purchasing power; the effect of monopoly is to decrease if not destroy purchasing power among the people. The most insidious and most successful enemy of the New Deal is this power of vast combinations to fix prices and take off all the gains which may come to the farmers, the producers, and the laborers."

All of which means what?

In the first place, what does Senator Borah mean by *monopoly?* Monopoly is a time worn political shibboleth. It is a term which has about as much concrete specification as the cubist statement "To dine is west."

Senator Borah is an active member of Congress and claims sympathy with the New Deal objectives.

Why doesn't he come out and declare who, what and where the monopolies are that are the insidious enemies of the New Deal? Why not point out specifically "those vast combinations" which have power "to fix prices and take off all the gains which may come to the farmers, the producers and the laborers"?

If Senator Borah or any other politician has evidence that such power to fix prices exists, is he not perforce of his public office, duty bound to disclose it?

What is the purpose, in these fact-finding days, of making charges in wholly nebulous and generality terms? The country is fed up on innuendoes. Let's have the facts. With the facts before the people, they will determine what the operations shall be.

We agree with Senator Borah that "the basic purpose of the New Deal is to increase purchasing power" and that is exactly what the New Deal started out to accomplish. But how on earth can purchasing power be increased except by increasing wages, increasing pay rolls, and shortening the hours of labor. And when that is done where is the money to come from to pay for all these specific increases? Is there any such thing extant as increased purchasing power, without increased pay? And where is the increased pay to come from except from increased prices?

Under the New Deal the paper industry at the call of the President immediately started to put more men to work, on shorter hours and higher pay—4,000 more men were put to work in the industry during the first 7 months. The cost of labor alone per ton of paper produced increased 50 per cent since May 1933. At the same time, the cost of all manner of supplies, raw materials and fuels advanced materially. In the meantime and at present date, the industry is running at its lowest production of tonnage. Who is going to pay these increased costs? The industry cannot. Where is the money coming from to support the increased purchasing power except from the increase in paper prices?

And yet were the industry to attempt to raise paper prices only to the extent of covering the increased cost of the increased purchasing power, it would be met immediately with the charge of *monopoly!*

Senator Borah knows, as well as he knows what state he represents, that there is no "monopoly" in the paper industry. He further knows that there exists

no "vast combinations of power" in this Industry to "fix prices" and pluck the bloom of gain off the flowers grown by the farmers, producers and laborers.

We challenge Senator Borah to prove by specification that monopoly is the enemy of the New Deal in the paper industry and is the factor which is causing the delay in recovery. We do know that the New Deal has been halted by the monkey wrenches thrown into its workings by maladministrative politicians. We are exceedingly suspicious that the monopoly bogie man created by politicians for election purposes is a subterfuge and political smoke screen.

Let's have the facts.

On the Other Side of the Desk

DID you ever sit on the other side of the desk? In other words, have you ever travelled on the road for the primary purpose of selling the products of your company? If you have, no doubt the experience is noted in your calendar of events as one of the most informative that you have ever had. If you haven't, you may or may not fully appreciate the value of such endeavor on the part of others.

Making sales contacts is one of the most important functions of any business. In many instances, the salesman is the only direct contact that the prospective customer or purchaser ever has with the company that the salesman represents. He is the special envoy of his concern and because of the importance of his task is usually chosen with meticulousness.

No doubt some inexperienced or unqualified representatives are sometimes sent out to contact the trade, but by and large the majority of them either through study or experience, or both, have a fund of knowledge that, if tapped properly, might be found of great value by those upon whom they call.

Consider also that each salesman contacting you in the interest of his organization is entitled to the same courtesy that you would expect prospective customers or customers to display toward your representatives when called upon by them. You appreciate the value of your representatives' time in making calls. Maybe you have actually calculated how much it costs to have one of your men report that a certain call was made, but the one to be seen was tied up in conference and could not be molested. Such calls, to be sure, are unproductive and expensive as your organization remains uninformed on the needs of the prospect or customer.

So it is, if such should be the case, if a salesman called upon your firm to ascertain whether his company might be in position to serve you and would be turned down unnecessarily and without a hearing. If the line represented by the salesman is well known to your firm, and you are not in the market for anything of like character, it only takes a moment to inform him of this fact in some courteous manner so that he can be on his way. If his firm and line are both new to you, it is to your advantage to ascertain what he has to offer. If you don't, you may be missing something that your competition has acquired and through it decrease your advantage in the marketing set-up. Should it be learned that the line is uninteresting and detailed information not desired, the interview could be terminated quickly and graciously. In so doing, the salesman would leave with a kindly thought toward you and your company, and through it certain business might actually find its way into your plant without development effort. The man on the other side of the desk had become your good-will ambassador and had done his job well.

Members and Friends of T.A.P.P.I.

SEPTEMBER 10, 11, 12 and 13, 1934, are important dates for every member and friend of T. A. P. P. I. On these days will be held at Portland, Oregon, the nineteenth fall meeting of the Association. This meeting has been designated as the T. A. P. P. I. International Convention because of the attendance expected from the United States, Canada, Mexico, Japan, China and European countries.

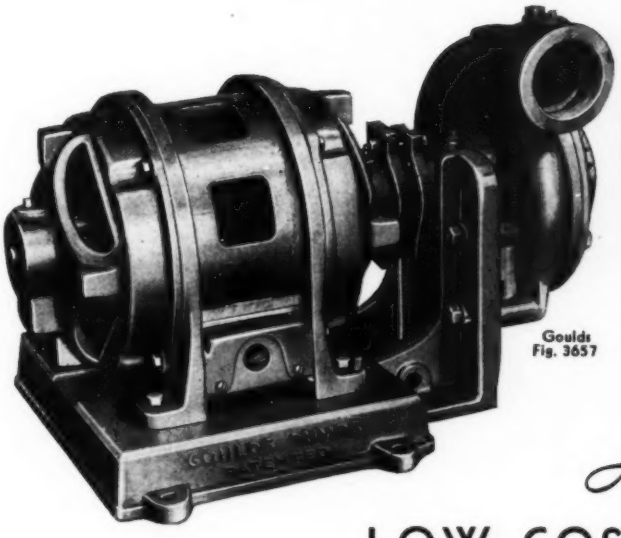
For many it will mean a long trek, but for those from the East and Middle West who meet in Chicago, the journey should be far from irksome. Arrangements have been completed with the Northern Pacific Railway to operate a T. A. P. P. I. special out of Chicago on the evening of September 5. The time set for the departure of the train is 10:30 p. m., so that any one fortunate enough to arrive in the city that morning, or even earlier, has an opportunity to visit A Century of Progress.

In addition to the pleasure derived in making the trip from Chicago to Portland in a group it is understood that arrangements have been completed so that every one aboard the T. A. P. P. I. special may enjoy an Indian Show at Mandan, N. D., a visit to Yellowstone Park, and a dinner dance at Spokane while enroute.

To these features, and others after arrival in Portland, has been added an extensive program of papers. These papers cover a wide variety of subject matter, so there should be something for every one.

If you have not already planned to attend this meeting, there is probably yet time to arrange your schedule of work to meet it. See what you can do, and go, if possible.

GOULDS



Goulds Fig. 3657

CLOSE-COUPLED

Motor Centrifugal

PUMPING UNIT

(PATENTED)

A compact

LOW-COST, HIGHLY EFFICIENT

Pumping Unit

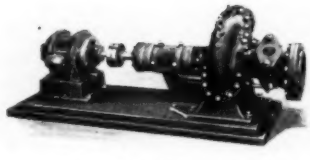
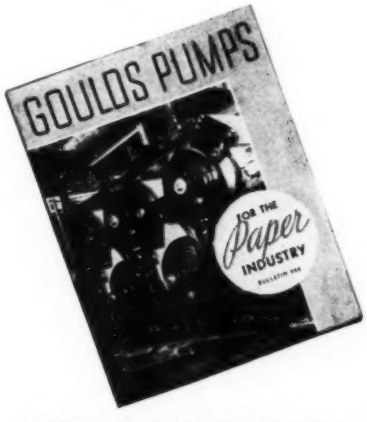


Figure 3105 is a heavy duty paper stock pump for stocks up to 8%.



Goulds Pump Manual for Paper Mills contains a wealth of information that every paper mill engineer should have. Includes valuable selection charts for adapting standard pumps to individual applications. Data section gives pipe friction formulas, conversion charts, etc. A copy will gladly be sent on request.

A general service unit used extensively in the paper industry because of its high degree of reliability and efficiency.

A practical pump because of the following advantages not usually found in a pump of low cost:

1. Self-venting top horizontal discharge prevents loss of capacity or head due to air binding.
2. Impellers of open warped vane type permit pumping of many liquids which cannot be handled with enclosed impellers.
3. Extra deep stuffing box with vertically split bolted gland to facilitate packing.
4. Enclosed water slinger directs gland leakage to bed plate.

Heads from 10 to 290 feet. Capacities up to 1000 G. P. M. Carried in stock with standard motors.

Don't overlook the complete line of pumps for light and heavy paper stock, and Goulds Hydroil Oil Purifier that keeps lubricating costs down.

Ask for the New Goulds Pump Manual that describes Goulds Service for Paper Mills.

GOULDS PUMPS Inc.

SENECA FALLS N. Y.

ATLANTA, BOSTON, CHICAGO, HOUSTON, NEW YORK, PHILADELPHIA, PITTSBURGH, TULSA, Representatives in all Principal Cities

We May Expect Increasing Trouble

By WILLIAM SIBLEY

SEVERAL months ago there was issued an order from the New York headquarters of the Communists' organization which in substance said: Start fomenting and agitating trouble in various industries and in various sections of the United States—these to culminate in a nation-wide disturbance during August, 1934.

This writer has known of several such sweeping orders (of one type or another) issuing from those same central headquarters with only disappointing failure as the result. Heretofore, most of the orders (more especially in the industrial section of Communistic activity) might readily be said to have been "flops." So also may this particular order, the effect of which is now being felt in several cities but the final result of which we will learn only with the passage of time.

I have tried to keep abreast of Communist activities for fifteen years. And that is time enough to have long since lost my hysteria regarding its encroachment; long enough to have learned the wisdom of calmness in the face of possible alarm. But the successful agitations which have been and are now being raised in so many different industries and such varying sections of the country, suggest this subject for this month's issue. The longshoremen of San Francisco and some Atlantic seaboard cities, the truckmen of Minneapolis, textile workers in Alabama, pecan shellers in Texas, metal workers in Wisconsin, copper miners in Montana, coal miners in Illinois, knit goods workers in New York, wool workers in Connecticut, livestock handlers in Chicago, and the many other disturbed labor bodies supply evidence not only of the huge proportions of the job now confronting American industry but of the well-oiled, smoothly working, far-sighted interests and influences of the Communists.

What will be the culmination in August? Whether the culmination will be then or some other time; whether there will be any culmination at all, no one yet knows. Conditions however are not healthy. The recently averted industry-wide strike in the automotive field is still under attack—by no means settled. In steel, a devastating strike was averted some time ago, but there is still talk on both sides of a showdown. The threatened national strike in the textile industry has thus far only been postponed, there being acute restlessness in many textile centers. The railroads are working on only a temporary agreement.

Section 7a of the NIRA is the chief reason for these difficulties .... Because of the ambiguity with which that section of the code was phrased and the divergent interpretations that ambiguity permitted. Employers interpret 7a as being capable of satisfaction as much through employee representation plans or intra-plant organizations as through labor unions. Organized labor believes 7a definitely establishes collective bargaining with labor unions as a normal industrial practice. The employees, as usual, are between the devil and the deep sea.

Such controversies could quickly be ironed out and industrial recovery set on solid ground were it not for the fact that Communists have taken advantage of the situation and dispatched skilled agitators to various points to prevent settlements of almost any kind.

Whether or not the paper industry will become involved in labor disputes there is no prophesying. Should our industry, or any individual mill, become so involved, or should some paper mill executive serve on local boards of mediators in extraneous disputes, it is sincerely to be hoped that such men, or managements, will keep firmly in mind that it may be the Communists who are the actual disturbers of our national peace.

Free speech and free assembly are Anglo-Saxon fundamentals, in the long run political and social safety. We foresee and to a degree control contagious epidemics, famine, floods, all in terribly devastating forms; but we but feebly combat in advance the demoralizing antagonisms of industrial conflict. We seem to be without effective treaties, operating as preventive forces, to stay impending strikes and lockouts by compromise and conciliation. In the anticipation of trouble we are ineffectual. California, however, has told the Union that the general strike is civil war, and the Union, when it wants civil war, which it has tried before, will not accept it from sixteen Communistic units and the self-seeking agitators of the mighty and law-abiding army of American labor.

The Roman maxim still holds: "The safety of the republic is the supreme law." When that flag goes up the unity of Americans is the salvation even of the misguided. (Editorial by Wm. Hudson Harper, in August, 1934 issue of Chicago Commerce.)

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THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

Production Planning

B. M. THOMAS[1] and H. P. CANNON[2]

IT is entirely possible that the paper industry has never been developed to a point of systematic production control based on predetermined demand. Yet this seems hardly reasonable considering the age of the industry and its rapid growth, but the thought is most logical in the light of the recent enforced allotment plans made necessary under recovery codes. The fact is that the paper industry, as well as many others, is being forced to put its house in order under great disadvantages and at great expense and this necessity will seriously affect every producing plant in the country and make necessary a definite scheme of production —a plan of control which must satisfy all codes as well as customers and supply justification for the industry in point of return on investment.

Transition Period

Fond memories of yesteryear may be recalled, when commerce caused few salesmen unrewarded, weary feet; when the delivery of goods was merely the precursor of payment; when demand somehow always seemed just ahead of supply for a neat profit and the size of the order gave independence to mill owners and made the customer trust to Providence and the help of a good maintenance crew that his order, or part of it, would be delivered within the month. Obsolescence was only a word in the dictionary and stocks would move eventually for one purpose or another so that the mills could run on and pile up inventory until further orders came in. But the world changes and with it that which used to be, leaving us scarcely the wherewithal to make a full week's operation—a life of complaints, credits and uncertainty whether the next shut-down will be from strikes or simply lack of orders.

No industrial enterprise would successfully meet the strict requirements of present day regulation without a highly developed method of scheduling its business. Without a plan in running your orders you could not possibly hope to come within all the code restrictions and at the same time serve your customer. While we may take exception to some of the rigid enforcements of the recent codes, we nevertheless realize that the strength of this code regulation lies no less in its inducement to industry to run its business more efficiently than in its temporary effect of pulling us out of a hole. The difficulties of establishing such a method of efficient planning are numerous and are worth considering at this point.

Most of us had reduced our organizations to the minimum in an effort to cope with the depression; many had as a last resort discontinued research and development work and had thrown overboard everything which might be considered dispensable, even though only temporarily. Efforts were made to accomplish more work with fewer men and in a shorter space of time. Costs were reduced to unheard-of levels and purchasing agents named their own terms—all resulting in the consequent upheaval with which we are familiar. As opposed to this, we have recently found ourselves faced with the necessity of deliberately increasing our cost of production for the common good, and this process, we have found, invariably results in a loss of control and efficiency. For example: The addition of numerous factory workers and new employees who become assimilated very slowly and who, temporarily at least, are so new to their work as to require the utmost attention by the management. Labor cost per unit of work advances to an alarming degree and the problem of management becomes greatly increased.

In all of this we are not gainsaying the fact that the cost frequently is offset by the reward, but nevertheless the plant management is confronted with the problem of improving its effectiveness in the face of these obstacles. It must increase its ability to deliver orders quickly, to add to its quality and better its methods under innumerable handicaps in order to maintain a cost of operating that will permit a profit and offset the added burden of conducting business. In some cases it has been possible to pass along to the customer the additional cost of meeting the new requirements but we must call upon all the ingenuity at our disposal to operate satisfactorily under such conditions. Management in our generation has never had a similar task.

1. Plant Manager, Eastern Div. Container Corp. of America, Manayunk, Philadelphia.

2. Technical Supt., Container Corp. of America, Manayunk, Philadelphia.

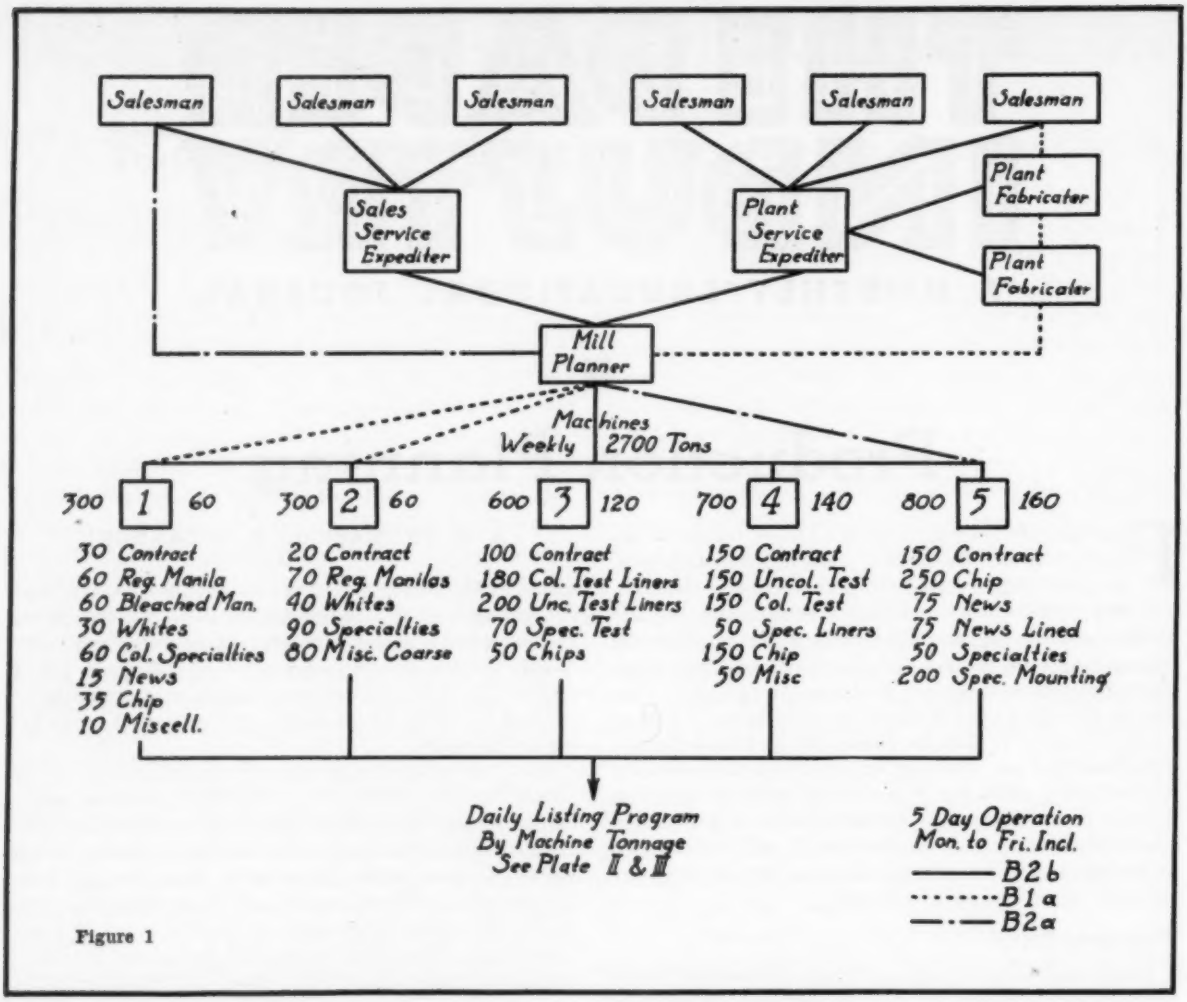

Figure 1

Differentiation of Paper Mills

With the growing intensity of American business and the development of more producers in a given field, the fact becomes more and more apparent that the order goes to the producer who has quality, and the repeat order goes to the producer who has not only quality but service. To maintain and increase quality in the face of some of the obstacles of today is no small matter, and particularly is it difficult to establish a service routine which will insure acceptable deliveries to a customer who is solicited on all sides by producers using up-to-date methods of service.

Well planned production for paper mills, to be specific, must be flexible. The making of writing paper cannot be compared to that of glassine or folding boxboard since each has a different requirement in the handling of raw materials, a different cycle of production, and different finishing and shipping operations. Most important, each has a different method of marketing and of distribution. Obviously, any operable plan must not concern itself wholly with any of these factors but rather should be developed with a view to all of them. Fit a plan to your conditions but first know the conditions.

Arbitrarily, paper mills may be said to fall in different classes which may be designated as follows:

A—*Product Service,* denoting the mill which distributes what we may term "stock items" of standard quality and whose delivery of goods is usually made from perpetual inventories. The problem in this type mill (of which few remain) is one of sales concentration and for this reason it finds little place in this discussion.

B—*Sales Service,* a type including any mill which is in business to sell its product and give service *on demand.* This type includes the mill which sells particularly on contract for special and specific materials. Such a mill may also obtain business for special grades or specific quality to be made for future delivery, and in this regard differs from the mill defined above. These mills may be further divided for purposes of plan discrimination into:

(1)—*Self-contained,* meaning the plant which uses its entire output in further fabricating finished products.

(2)—*Marketing,* indicating the plants whose partial or entire production must be sold on the supply and demand market. Since the importance of production planning is in direct proportion to the size of the plant, we consider further:

(a)—*Single-product.* A plant in which each ma-

Monday Schedule Week of 5-7-34

Machine	1	2	3	4	5
	Tons Grade Customer	Tons Grade Customer	Tons Grade Customer	Tons Grade Customer	Tons Grade Customer
Mon.	29 Man. Rolls Contract 31 Fold. Manila Name	25 Fold. Manila Contract 35 Fold. Manila Name	82 .030 Col. TL Contract 38 .016 Col. TL Plant	140 .016 Unc. TL Contract	Not Running Start Tuesday
Tues.	6 Fold. Manila Name 24 Blea. Manila Name 16 W P Coated Name 14 White Box B Contract	20 Fold. Manila Name 20 White Box B Name 20 Mist Grey Name	120 .016 Col. TL Plant	10 .016 Unc. TL Name 130 .016 Col. TL Name	50 Chip Contract 110 Chip Name
Wed.	16 White Box B Contract 44 Brown Box B Name	35 Mist Grey Name 25 Blue Box B Name	15 .016 Unc. TL Name 25 .016 Unc. TL Name 80 .016 Unc. TL Plant	50 .016 Yel. HTL Name 90 .016 Yel. HTL Plant	100 Chip Name 30 Spec. News Name 30 Spec. News Name
Thurs.	6 Brown Box B Name 15 Spec. News Name	20 .030 Tube Bd. Name	50 .030 Col. HTL Name 50 .020 Chip Plant 20 .040 Chip Plant	20 .016 Unc. HTL Plant 60 .020 Chip Plant 20 .025 Chip Name 40 .040 Chip Plant	75 News Lined Name 25 Col. Set up Name 60 Spec. Mounting Name
Fri.				20 .040 Chip Plant	
On hand Next Week					

Figure 2

chine produces the same grade and quality, differences being only in speed, width or minor detail. A Single-product plant of two or more machines, therefore, can be considered in the same class as one operating a single machine, in which the scheduling becomes less difficult in its application.

(b)—*Multi-product.* A plant in which each machine produces a different quality of product not interchangeable with another produced in the same mill.

Co-Ordinated Responsibility

Now for the moment, regard yourself as an operator and, leaving these arbitrary divisions in which your mill may be classed, consider its operation as though a plan of production control has already been put to work. You must first believe that its successful application lies primarily in the hands of your sales organization or sales agency. If this is forgotten, you immediately reduce your profit or place yourself at a disadvantage in competition. The reason for this is obvious. The sales department, being responsible for cashing in on your output in this catch-as-catch-can market, can embarrass you with short delivery requirements and unprofitable mill grade changes. Therefore, close co-operation becomes a prime requisite wherein you become the instructor, not on *how* to sell but *when* to sell *what*. Individual machine characteristics should be studied and operating limits with which you are already familiar should be definitely adopted and maintained as a basis of your plan routine. The flexibility of your equipment or the lack of this flexibility should establish the method of delivery commitment.

Production Plan Structure

Let us assume, then, that this preliminary groundwork has been done; namely, that you have classified your mill for type of service, output and product. Let us assume that there is complete co-ordination through education of sales and production forces with regard to operating variables. Let us assume further that you are familiar with such factors as material control, product analysis, slack and rush periods, etc. There remains the execution of a scheme. One such is illustrated in Figure 1. This appears to be a cross between

Thursday Schedule Week of 5-7-34

Machine	1	2	3	4	5
	Tons Grade Customer	Tons Grade Customer	Tons Grade Customer	Tons Grade Customer	Tons Grade Customer
Thurs.	8 Spec. News Name 20 Spec. News Name 20 Spec. Bend Name 10 Col. Chip Name 2 Chip Name	5 Blue Box B Name 26 Spec. Fl. News Name 10 .020 News Ld. Name 19 .030 Tube Bd. Name	70 .016 Unc. TL Name 20 .030 Col. HTL Name 30 .030 Col. HTL Name	20 .016 Unc. HTL Name 70 .030 Unc. HTL Name 20 .030 Unc. HTL Plant 30 .030 Chip Plant	20 Col. Set-up Name 40 Double BC Name 40 Spec. Set-up Name 60 Spec. Mounting Name
Fri.	18 Chip Name 30 Semi-bend Name 12 Black Box Name	1 .030 Tube Bd. Name 40 Misc. News Name 19 Bender Chip Name	20 .030 Col. HTL Name 50 .020 Chip Plant 50 .040 Chip Plant	60 .020 Chip Plant 20 .025 Chip Plant 60 .040 Chip Plant	160 Spec. Mounting Name
On hand Next Week	30 Reg. Manila Contract 30 W P Coated Contract 14 Blea. Manila Name 22 White Box Name 25 Chip Name	11 Fold. Manila Name 50 White Box Name 40 Col. Box Name	100 .030 HTL Contract 180 .016 Unc. TL Plant	100 .016 Unc. TL Contract	60 Chip Contract 110 Chip Name 100 Spec. Mounting Name

Figure 3

an organization chart and a process flow sheet but actually it is a picture of the details of planned production in a board mill.

From the foregoing description of a "Sales-service" mill engaged in marketing its "Multi-product" unit on a supply and demand basis, it will be possible to follow out this plan which becomes known as B-2-b in this case, but through slight modification may be adapted to your own mill, in whatever size or class it may fall. You will note that under "machines" there is a general listing of the grades to be run for each unit numbered 1 to 5 inclusive. The figures to the right of the machine designations indicate normal daily tonnages expected; those to the left, the normal weekly tonnages. A previous sales analysis will have made possible a budgeting of the grade tonnage so that normal demand may be met each week with minimum customer inconvenience. The arrangement or order of grade production is based on operating experience with a view to the most economical grade changes, and at this point the importance of the education and co-operation of the sales organization must be emphasized. Years of experience and thought presumably have been given to your production planning. Your aim is profit from your business but this profit may be easily voided by too ready acceptance of "rush" orders from a salesman who, through lack of anticipation or proper analysis, has failed to co-ordinate his order taking with your production planning schedule.

It is too much to expect that the grade budget of each machine will be met regularly each week. Some grades may not reach their expected total and, in fact, may not even be listed at the time the schedule is made up, and in this case other grades can be inserted to fill out the week provided continuity of operation can be maintained in doing so. Such a change necessitates a daily listing such as is shown on Figures II and III. This indicates the operation plan from day to day and if the anticipated production is not carried out, the list automatically furnishes information as to the revised schedule. The key man for this work (which requires more training and judgment than is generally realized) is the Mill Planner. He assembles the orders on demand and schedules the tonnage in the proper sequence. Naturally, the importance of his work is in direct proportion to the number of machines and the complication of the operating problem; and where a number of machines are running various grades under different conditions, his place in the planning of this production can hardly be over-estimated. The Mill Planner should be relieved of worry and effort in connection with the orders until such time as they have been cleared of all complications with the customers and he should not be hampered by having to make delivery promises to customers. This work should be done by the Sales Service Expediter and the Plant Service Expediter who may be considered as means of liaison between sales and production. They assemble orders of their respective groups, verify delivery dates, check quantities, specifications, etc., and prepare for production in the mill. They may also act as telephone salesmen and assist in keeping the schedule completed when gaps are anticipated.

No discussion is necessary as to the function of the sales group. It is understood that familiarity on their part with the daily schedule is absolutely necessary. A glance at the daily corrections automatically tells the salesman that today quantities of a certain grade will be run and that tomorrow there will be room for him to squeeze in the requirements of his star customer who has unexpectedly given him a rush order for a scheduled but under-filled budget grade.

All sorts of variations can be made in this planning chart depending upon the mill conditions. If your mill has only one or two machines, you may possibly do without the Service Expediter and handle the work with the Mill Planner only. If your mill classifies as a self-contained plant of small production, you may again consolidate the two types of work in one man, namely the Mill Planner.

Effectiveness of Schedule

In these times when there are many opportunities for planning to be upset by unforeseen conditions, the daily schedule becomes subject to corrections and additions which must be made, not only for the customer's advantage but also in such a way that the mill's interests are kept in mind. If the orders come in slowly, the schedule may be considerably changed as the week advances, but these changes must be made with an eye to the continuity of production and in full consideration of the planning fundamentals which previously have been agreed upon. There may be some doubt in your mind that all the necessary consideration can be given to a customer's requirements and at the same time carry out a planning schedule of the type just discussed. Difficulties will be encountered but unless your production planning is sufficiently flexible and sound to serve both interests, it will not be successful. Your customer in demanding that his order be delivered at a specified time, indicates that he has some such planning schedule in his own work, as otherwise it would not be necessary for him to be so insistent that his goods arrive on time.

Well planned production is profitable and it is doubtful that any industrial enterprise can operate successfully under the severe requirements and regulations placed upon industry today without a highly planned and co-ordinated method. Advantages are obvious as follows:

1—Continuity of plant operation which enables the customer to anticipate deliveries and order regularly.

2—Lower grade costs brought about through fewer changes, less waste, lower conversion cost, etc.

3—Power Plant economy through better heat and power balances maintained by avoiding overloads and subnormal demands. Also similar advantages in other incidental departments such as Shipping and Materials Handling, all of which are dependent for their successful operation on a well planned schedule in the main mill departments.

4—Customer satisfaction in that deliveries and quality will be held uniform through operating experience on repeat business.

To summarize, adopt a plan which is simple and fundamentally correct; adhere to it strictly through education of your organization, both sales and operating, familiarize your customers with your production-delivery scheme and then maintain this schedule on a basis as inflexible as possible.

Identification and Microscopy of
Woods and Wood Fibers
Used in the Manufacture of Pulp*

By ELLWOOD S. HARRAR[1] and J. ELTON LODEWICK[2]

THE identification of the woods comprising a sample of pulp or a sheet of paper is attended by difficulties not present when identification is made of the wood before pulping. In the first place, the arrangement of the individual fibers has been destroyed so that the relations of wood elements to each other are no longer usable as distinguishing characteristics. In the second place, the action of chemicals and the hydration resulting from beating may partially obscure or destroy the minute cell characteristics necessary for the separation of closely related species of wood.

Development of the Wood Fiber

In order to understand and interpret the wall sculpturing on wood elements, a knowledge of their origin, development and functions is prerequisite.

Wood is made up of cells, even those elements which are least cellular in appearance being only modified cells or cell combinations. The young plant cell is nearly cubical or brick-like in shape, and is nothing more than a small mass of protoplasm (living substance) bounded by an imperceptibly thin wall of denser protoplasm which might be likened to the denser film surrounding a drop of water. This is known as the *primary cell wall.* This wall is apparently pierced at intervals by minute strands of protoplasm which give continuity to the protoplasm in adjacent cells.

In early life, the primary wall is gelatinous in nature, permitting adjacent cells to slip by each other as they increase in size. As soon as enlargement has ceased the wall loses its gelatinous nature by the loss of water, and adjacent walls unite to form a unit. Thus it is well nigh impossible to distinguish but one primary wall between any two cells. This separating layer, composed of the primary walls of the adjacent cells, is termed the *middle lamella.* Such a union of the primary walls binds the cells more closely together, imparting unity and rigidity to the wood.

As the cell increases in size the protoplasm occupies a smaller and smaller portion of the cell cavity, and finally is restricted to a relatively thin layer lining the inside walls of the cell.

Coincident with the increase in cell size comes differentiation in shape. Some cells change but little, remaining relatively small and somewhat cubical even at maturity, as do the cells of many wood rays. Other cells may increase in length to produce an element that is slender and elongated, such as the tracheids of the coniferous woods and the fiber tracheids of the hardwoods. Still other cells may expand primarily in diameter to produce elements that are relatively short and wide, as the vessel segments of the hardwood species. When the cell has attained its full growth the wall begins to thicken and to become more rigid. Additional cell wall substance is laid down as a lining on the primary wall, and differs chemically and frequently physically from the primary wall. It is known as the *secondary wall.* In its early stages, secondary thickening does not evidence cell variations in different parts of the tree. Soon, however, modification does appear in both composition and structure.

In certain cells the wall thickens to only a slight extent, while at the other extreme are those in which the wall becomes so thick as to fill all or practically all of the cell cavity. These differences in wall thickness are adaptations to the special functions of certain types of cells; strengthening and protecting cells being heavy-walled, conducting and storage cells normally being thin-walled.

Connection between the many living cells of the plant body is necessary for the transfer of stimuli, food and water. It has been noted that strands of protoplasm penetrate the primary wall in young cells, thus providing this connection. The integrity of these protoplasmic strands is maintained as the cell increases in age because no secondary wall is produced in their which are least cellular in appearance being only immediate vicinity. This leads to thin spots in the cell wall which are known as *pits.* These pits vary in shape, size, and character depending upon the type of cell in which they occur and upon the type of cell with which it connects.

The differences in composition and structure of cells are merely adaptations enabling the cell to more efficiently carry on its special functions in the plant. It is the variation in size, shape and composition which fit certain cells for use in paper. It is the variation in structure which affords a means of distinguishing between the types of cells in each plant as well as between the same type of cells from different plants.

Fiber Elements of Coniferous Woods

The wood of coniferous trees is much simpler in structure than is that of broadleaved or hardwood trees. The conspicuous elements of any coniferous wood are elongated prismatic cells with tapered ends, known botanically as *tracheids,* but referred to as fibers by the pulp and paper maker. The tracheids are further characterized by the presence of conspicuous bordered pits in their walls. In most of the commercial

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* This is the third and last installment of a series of articles by these co-authors. Coniferous woods were considered in the first article and hardwoods in the second. These articles appeared respectively in the February and May, 1934, issues of this magazine.

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coniferous woods the bordered pits occur in single rows along the tracheid, with some tendency to appear in double rows near the ends. In some woods, however, the double-row of pits is common in the wide elements of the springwood while the uniseriate arrangement prevails in the narrow summerwood tracheids. Occasional woods show three or even four rows of pits in the widest fibers. Such a possible variation renders the bordered pit arrangement of little value as a means of separating one species from another. These pits serve merely to indicate that a coniferous wood is present in the sample. The tracheids make up 86 to 90 per cent of the wood and they are generally the only elements recognizable in chemical pulp. They are arranged in the wood with their long axes parallel to what was the axis of the tree. Interspersed among the tracheids in many woods are vertically elongated *resin ducts* with their linings of epithelial cells and *resin parenchyma cells* whose walls are destroyed during cooking or whose small size permits of their loss during screening. The horizontally elongated resin ducts within the wood rays of certain woods also disappear during cooking. Thus the resin-producing elements are not available to aid in identification. At right angles to the tracheids, and running radially in the tree, are strips of cells (commonly brick-shaped) known as *wood rays*. In the coniferous woods they are usually one cell in width (except when bearing a resin duct), and vary in height from a few to many cells, the range depending partly upon the kind of wood. The cells of the wood rays are usually not present in chemical pulps having been lost in screening though they are frequently seen attached to groups of tracheids in mechanical pulps.

Each tracheid is in contact with at least two wood rays, and frequently with more, somewhere throughout its length. Since the tracheid is the unit of the vertical conduction system of the tree while the wood ray provides horizontal conduction and serves as a place for food storage, it would be logical to expect a highly developed connection between the two elements. Such is the case, the pits connecting the tracheids and the rays being prominent on the tracheid wall. The points at which the wood rays come into contact with the tracheid are known as *ray crossings*. The pits in these areas present about the only reliable characters by which to distinguish between the various kinds of coniferous woods.

As described earlier in this series, the rays in coniferous woods may be composed of one or of two types of cells. The most abundant type of all, and the one present in all coniferous woods, possesses pits with little or no discernible border. This is the *ray parenchyma cell*. The second type has bordered pits, which may be distinguished from the inter-tracheid bordered pits by their smaller size. Such a cell is known as a *ray tracheid*. Cells of this type may be restricted to the margins of the ray *(marginal)* or may also occur in the body of the ray *(interspersed)*. The presence or absence of ray tracheid pits in the ray crossing is of diagnostic value, but this pitting is the first to be rendered inconspicuous by chemical treatment and by beating.

In mechanical pulps and in the less completely cooked chemical pulps the relationship between the ray tracheids and ray parenchyma cells is observable wherever a few tracheids are held together by wood ray cells. In these cases the character of the ray tracheid wall becomes of diagnostic value. The wall may be of uniform thickness or may be irregularly thickened *(dentate)* as in the hard pines.

A few species of coniferous woods show *spiral thickenings* on the tracheids. These are thicker places laid down on the inside of the secondary wall, and appear as darker bands crossing the tracheid at an angle. The steepness of the spiral appears dependent upon the width of the tracheid, hence has no diagnostic value.

Fiber Elements of Hardwoods

The woods from the broadleaved trees, commonly known as hardwoods, have a more complex structure than do the coniferous woods. During their evolution they have become more highly specialized, which has given rise to a greater variety of elements, each especially adapted to a separate function. In the coniferous woods it has been mentioned that the tracheid acted both as a supporting and a conducting element. In the hardwoods one type of cell, the *fiber tracheid*, has become specialized for support, while vertical conduction has been assumed by another specialized element known as the *vessel*. The *fiber tracheids*, which will be called fibers for convenience, make up the bulk of most hardwoods, while the vessels are probably second in volume. Other vertical elements, such as tracheids, fibers, and wood parenchyma, may be disregarded here because they form but a small part of the wood.

The fiber tracheid, which is an elongated cell with tapered ends and bordered pits, warrants no extended description, because it shows such slight variation from wood to wood as to have little or no value in identification.

The vessel is a long tubelike structure which is occasionally circular but more commonly oval in cross section. It is formed through the coalescence or partial coalescence of the end walls in a series of cells placed end to end. During pulping, the individual cells comprising the tube are separated and appear as units known as *vessel segments*, although they are frequently termed vessels for brevity. These elements are practically the only ones showing structural variations usable in the identification of hardwood pulps. The vessel segments show ray crossings, as do the tracheids of coniferous woods, and the shape and arrangement of the pits in the ray crossings are of diagnostic value. The walls of the vessel segments exhibit bordered pits where they were in contact with adjacent vessels. The shape and arrangement of these bordered pits are constant within and characteristic for each kind of wood. The vessel segments of certain woods possess spiral thickenings which are valuable aids in identification.

During the coalescence to form a continuous tube the end walls have either entirely or partially disappeared. If the whole end wall is absorbed the opening appears as a circular or oval pore *(simple perforation)*. If the wall is partially absorbed the remainder appears as narrow bars across the pore, giving a ladderlike appearance *(scalariform perforation)*. In species showing this condition the number of bars, whether few or many, aid in identification.

In certain woods such as birch and red gum, these bars are very numerous but extremely thin and, as a general rule, they will become broken and fall away during processing of the pulp. Accordingly it is advisable to examine perforations with considerable care in order to determine if there may not be vestiges of bars along their periphery.

As described in an earlier paper of this series, the wood rays in hardwoods may be composed of one or of two types of cells, the *procumbent* and the *erect*. A ray composed entirely of the former is *homogeneous*, while a ray containing both types is *heterogeneous*. The description of wood ray cells is inserted for each species since these characters are of value in identifying the woods in mechanical pulps.

Specific Characteristics of Pulpwood Fibers

NON-POROUS WOODS

Northern White Pine *Pinus strobus* L.

Inter-fiber pits restricted to the radial walls in springwood fibers, on all walls in summerwood fibers, those in the springwood in storied or staggered rows one pit in width. Pits at ray crossings of two types; the ray tracheid pits usually marginal; the ray parenchyma pits window-like, generally one or less frequently two between contact faces. Ray tracheids mostly marginal; walls not dentate, profusely pitted. (Figure 1.)

Western White Pine *Pinus monticola* D. Don

Similar to northern white pine except that the inter-fiber pits in the springwood fibers are frequently paired. (Figure 2.)

Sugar Pine *Pinus lambertiana* Douglas

Similar to northern white pine except that the inter-fiber pits in the springwood fibers are commonly paired and more nearly circular than in the other white pines and the ray parenchyma pits at the ray crossing range from one to four. (Figure 3.)

Norway Pine *Pinus resinosa* Sol.

Inter-fiber pits restricted to the radial walls in both springwood and summerwood fibers, usually in single or double more or less staggered rows. Pits at ray crossings of two types; the ray tracheid pits marginal for the most part; the ray parenchyma pits window-like. Ray tracheids marginal for the most part; walls dentate. (Figure 4.)

Jack Pine *Pinus banksiana* Lambert

Inter-fiber pits restricted to the radial walls in both springwood and summerwood fibers, usually in uniseriate or staggered rows. Pits at ray crossings of two types; the ray tracheid pits marginal and interspersed; the ray parenchyma pits broadly lens-shaped but occasionally coalescent to form window-like pits. Ray tracheid pits marginal and interspersed; walls dentate. (Figure 5.)

Ponderosa Pine *Pinus ponderosa* Lawson

Inter-fiber pits restricted to radial walls in both springwood and summerwood fibers, commonly in pairs or in 2-3 staggered rows. Pits at ray crossings of two types; the ray tracheid pits marginal for the most part; the ray parenchyma pits broadly lens-shaped to slit-like. Ray tracheids mostly marginal; walls dentate. (Figure 6.)

Southern Yellow Pines Including:

LONGLEAF PINE *Pinus palustris* Miller.
SHORTLEAF PINE *Pinus echinata* Miller.
SLASH PINE *Pinus caribaea* Morelet.
LOBLOLLY PINE *Pinus taeda* L.

Inter-fiber pits restricted to the radial walls in both springwood and summerwood fibers, in uniseriate or staggered rows or paired in the broader fibers. Pits at ray crossings of two types; the ray tracheid pits marginal and interspersed; the ray parenchyma pits lens-shaped to slit-like, occasionally coalescent. Ray tracheids marginal and interspersed; walls strongly dentate. (Figures 7, 8, 9.)

The Spruces Including:

RED SPRUCE *Picea rubra* Link.
WHITE SPRUCE *Picea glauca* (Moench) Voss.
ENGELMANN SPRUCE *Picea engelemanni* Engl.
SITKA SPRUCE *Picea sitkensis* (Bongard) Carr.

Inter-fiber pits restricted to the radial walls in springwood fibers, in uniseriate or staggered rows, those on tangential walls in summerwood fibers sparse and minute. Pits at ray crossings of two types; the ray tracheid pits marginal, sparse; the ray parenchyma pits very small, somewhat distant, oval to angular, one to six (usually 2-4) per contact face in springwood fibers. Ray tracheids marginal; walls not dentate. (Figure 10.)

Douglas Fir *Pseudotsuga taxifolia* (La Marck) Britt.

Fibers with spiral thickenings. Inter-fiber pits restricted to the radial walls in springwood fibers, in uniseriate or staggered rows, present on all walls in summerwood fibers. Pits at ray crossings of two types; the ray tracheid pits strictly marginal; the ray parenchyma pits very small, distant, oval to circular. Ray tracheids strictly marginal; walls not dentate, frequently with indistinct spiral thickenings. (Figure 11.)

The Larches Including:

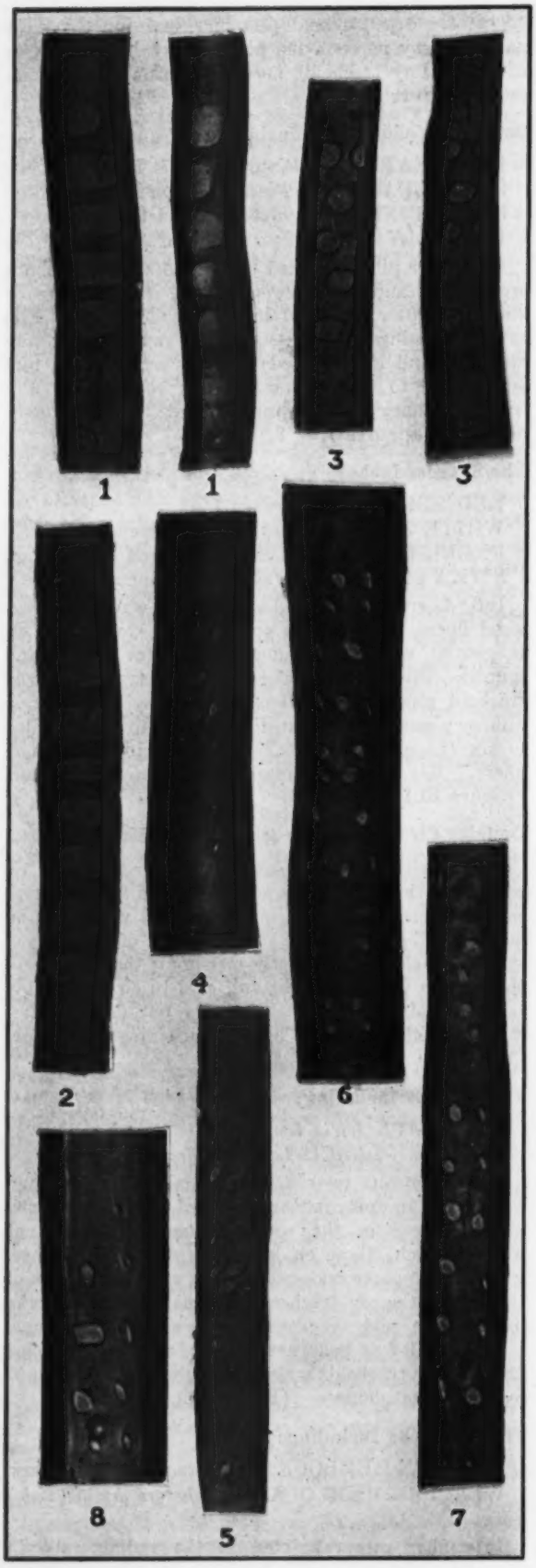
TAMARACK *Larix Laricina* (Du Roi) Koch.
WESTERN LARCH *Larix occidentalis* Nutt.

Inter-fiber pits restricted to radial walls in springwood fibers, in uniseriate or staggered rows, though commonly paired in the wider summerwood fibers of western larch; those on tangential walls of summerwood fibers sparse and small. Pits at ray crossings of two types; the ray tracheid pits small, sparse, the ray parenchyma pits very small, somewhat distant, oval to angular, 3-6 or more per contact face in springwood fibers. Ray tracheids strictly marginal, sparingly pitted; walls not dentate. (Figures 12, 13.)

The Hemlocks Including:

EASTERN HEMLOCK *Tsuga canadensis* (L.) Carr.
WESTERN HEMLOCK *Tsuga heterophylla* (Raf.) Sarg.

Inter-fiber pits restricted to the radial walls in



springwood fibers, in uniseriate or staggered rows, those on the tangential walls of the summerwod fibers sparse and minute. Pits at ray crossings of two types; the ray tracheid pits marginal or rarely interspersed; the ray parenchyma pits very small, somewhat distant, oval to angular, one to three per contact face in the springwood fibers. Ray tracheids strictly marginal; walls not dentate. (Figure 14.)

The True Firs Including:

BALSAM FIR *Abies balsamea* (L.) Mill.
LOWLAND WHITE FIR *Abies grandis* Lindl.
SILVER FIR *Abies amabilis* (Loud.) Forb.
NOBLE FIR *Abies nobilis* Lindl.

Similar to the hemlocks but normally lacking ray tracheids, hence having only one type of pit at the ray crossings. (Figure 15.)

Bald Cypress *Taxodium distichum* (L) Rich.

Inter-fiber pits frequently in horizontal rows of two to three in the radial walls of springwood fibers, present on all walls of summerwood fibers. Pits at ray crossings of one type, lens-shaped but smaller and more distant than those in the hard pine, one to four per contact face. Ray tracheids absent. (Figure 16.)

Redwood *Sequoia sempervirens* (Lamb.) Endl.

Inter-fiber pits frequently in horizontal rows of three to four in the radial walls of springwood fibers. Pits at ray crossings of one type, lense-shaped but smaller and more distant than those in the hard pines, one to six (usually three to five) per contact face; ray tracheids absent. (Figure 17.)

POROUS WOODS

Cottonwoods Including:

NORTHERN BLACK COTTONWOOD *Populus trichocarpa hastata* Henry.
EASTERN COTTONWOOD *Populus deltoides* Marsh.
SWAMP COTTONWOOD *Populus heterophylla* L.

Vessel segments quite variable in length, but always at least several times longer than broad; without spiral thickenings; perforations simple; inter-vessel pits crowded, hexagonal, with a broad border and horizontal oval or lenticular orifice; pits at ray crossings large, crowded, angular, usually in two to four staggered rows per cell. Fibers thin-walled for the most part; pits circular to lenticular. Wood rays homogeneous. (Figure 18.)

Aspens Including:

ASPEN *Populus tremuloides* Michaux.
LARGETOOTH ASPEN *Populus grandidentata* Michaux.

The features of the fibers of these two species are so

Ray Crossings of Coniferous Woods X-250

Fig. 1—Northern white pine
Fig. 2—Western white pine
Fig. 3—Sugar pine
Fig. 4—Norway pine
Fig. 5—Jack pine
Fig. 6—Ponderosa pine
Fig. 7—Loblolly pine
Fig. 8—Longleaf pine
Fig. 9—Shortleaf pine
Fig. 10—Red spruce
Fig. 11—Ponderosa pine

similar to those of the cottonwoods that no reliable means of separation are known. (Figure 19.)

Black Willow *Salix nigra,* Marsh.

The fibers of black willow are so similar to those of the cottonwoods and aspens that no reliable separating characters are exhibited. The piting in the vessel ends or "tails" is apt to be more prominent in black willow than in the aspens and the cottonwoods. If groups of ray cells remain attached to the vessels, black willow may be distinguished from the cottonwoods and the aspens by the presence of both erect and procumbent ray cells. (Figure 20.)

Yellow Birch *Betula lutea* Michaux.

Vessel segments often 10 or more times longer than broad; without spiral thickenings; perforations scalariform, with 8-20 or more thin rarely branched bars; inter-vessel pits crowded, extremely small, with a narrow border and slit-like orifice, the orifices of several pits often confluent; pits at ray crossings small, appearing as normal bordered pits except that they are grouped. Fibers thin- to thick-walled, with slit-like pits for the most part. Wood rays homogeneous. (Figures 21, 22.)

Beech *Fagus grandifolia* Ehrh.

Vessel segments 10 to 20 times longer than broad; without spiral thickenings; perforations simple, occasionally scalariform in segments from the summerwood and then with 3-7 relatively thick bars; inter-vessel pits generally rather sparse, not crowded, round to oval, with a broad border and angular to oval orifice; pits at ray crossings crowded, lenticular to angular, medium in size. Fibers mostly thick-walled, with lenticular to slit-like pits. Wood rays homogeneous to somewhat heterogeneous. (Figure 23.)

Chestnut *Castanea dentata* (Marsh.) Borkh.

Vessel segments from the springwood broader than long, those from the summerwood usually many times longer than broad; without spiral thickenings; perforations simple, rarely scalariform in segments from the summerwood and then with 2-5 thick bars; inter-vessel pits circular to oval, with a broad border and oval to angular orifice; pits at ray crossings large, variable in shape, crowded into definite groups. Fibers thin-walled, sparingly pitted. Tracheids thin-walled, profusely pitted on all walls. Wood rays homogeneous. (Figures 24, 25, 26.)

Tulip Poplar *Liriodendron tulipifera* L.

Vessel segments often 10 to 20 times longer than broad; without spiral thickenings; perforation scalariform, with 3-7 bars; inter-vessels pits round, oval or elliptical, with a broad border and horizontal orifice, in horizontal rows; pits at ray crossings large, crowded, variable in shape. Fibers mostly thin-walled commonly

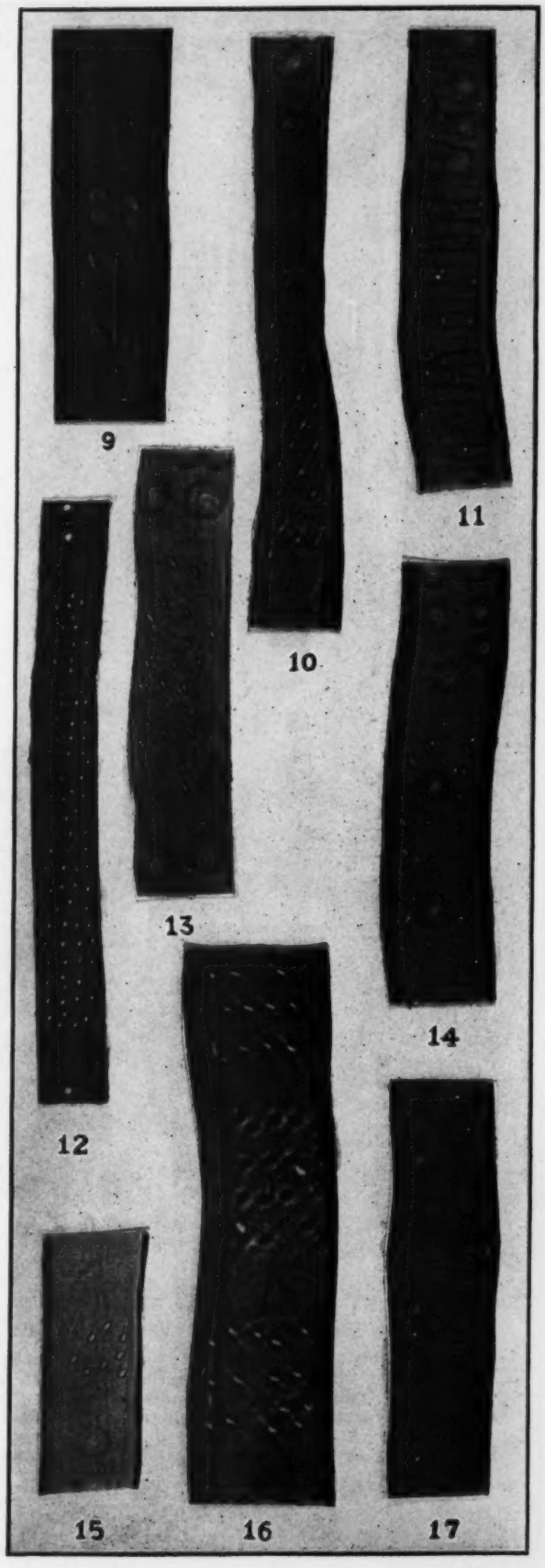
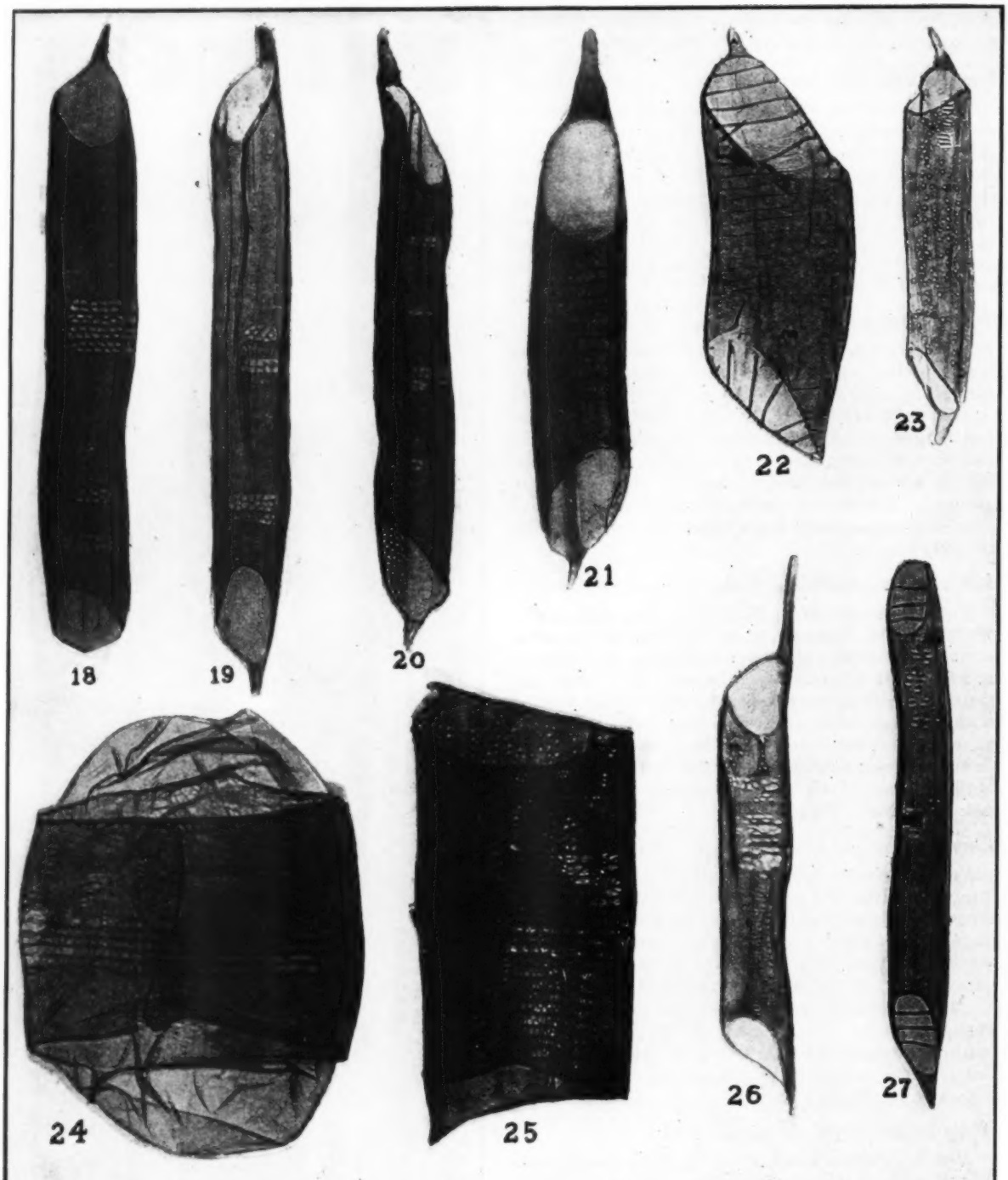
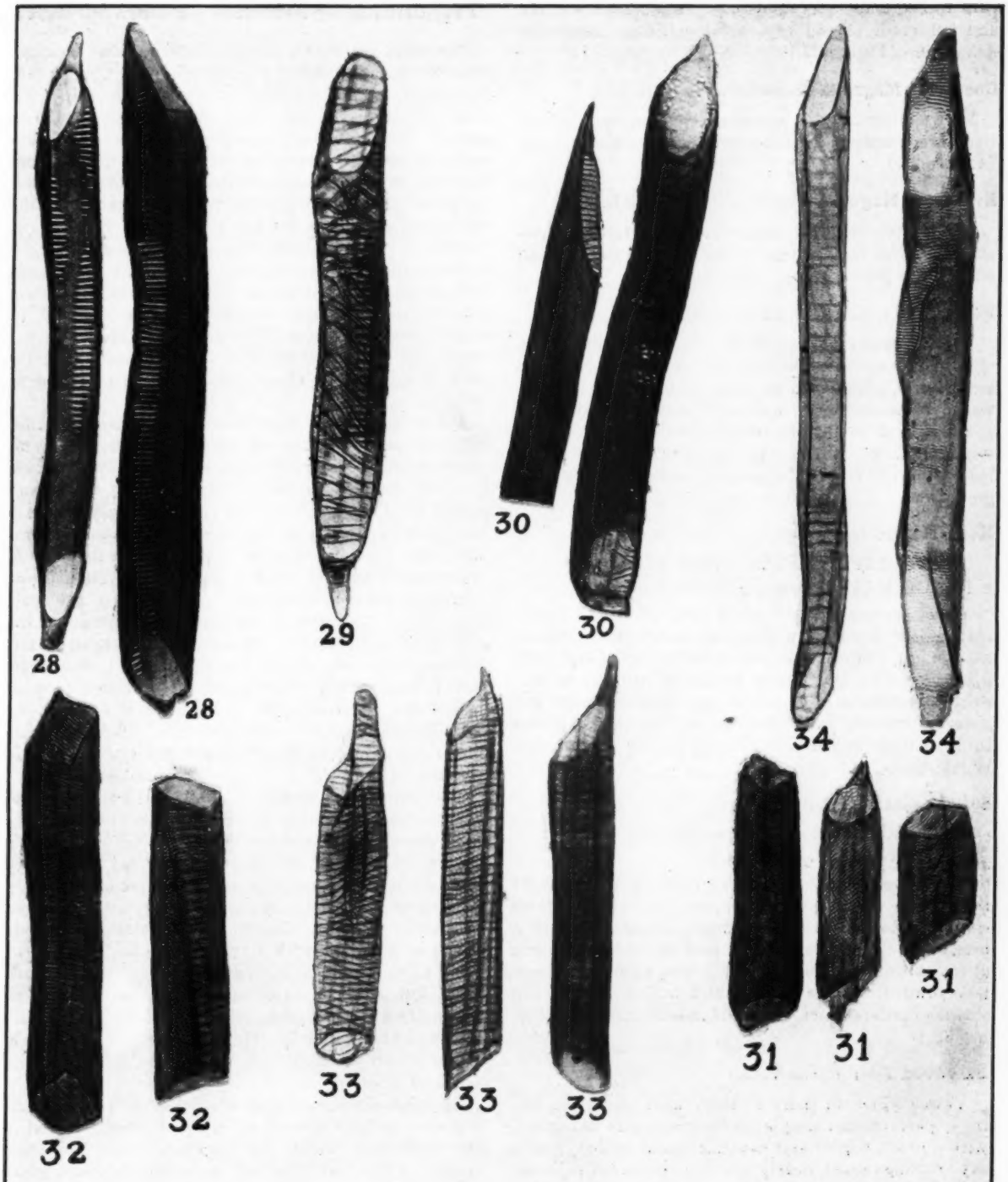


Fig. 12—Tamarack. The solitary ray tracheid pits to be seen at both extremities of the crossing often become more or less indistinct at higher magnifications. (The magnification of this figure is X-175)
Fig. 13—Western larch
Fig. 14—Western hemlock
Fig. 15—Balsam fir
Fig. 16—Bald cypress
Fig. 17—Redwood



Vessel Segments of Hardwoods X-150

Fig. 18—Northern black cottonwood Fig. 19—Largetooth aspen Fig. 20—Black willow
Fig. 21—Yellow birch. The scalariform bars are usually broken during blowing, screening and beating, thus often making their detection rather difficult. (See text)
Fig. 22—Early wood of the Yellow birch Fig. 23—Beech Fig. 24—Chestnut (Springwood). The large sac-like incision is a single thin-walled tylosis
Fig. 25—Chestnut (Springwood) Fig. 26—Chestnut (Summerwood) Fig. 27—Tulip poplar



Vessel Segments of Hardwoods X-150

Fig. 28—Cucumber magnolia Fig. 29—Evergreen magnolia
Fig. 30—Red gum. Note the scalariform perforation and spiral thickening in the tip of the segment to the left
Fig. 31—Sugar maple Fig. 32—Silver maple Fig. 33—Basswood
Fig. 34—Black gum. The larger segment is seen with a third scalariform perforation along its flank

with forked ends; pits numerous, lenticular to slit-like and bordered. Wood rays heterogeneous; erect cells marginal. (Figure 27.)

Cucumber Magnolia *Magnolia acuminata* L.

Very similar to tulip poplar except that the perforations are simple and the inter-vessel pits scalariform. (Figure 28.)

Evergreen Magnolia *Magnolia Grandiflora* L.

Similar to cucumber magnolia except for the presence of spiral thickenings on the vessel segments, and scalariform perforations. (Figure 29.)

Red Gum *Liquidambar stryaciflua* L.

Vessel segments extremely long, frequently with spiral thickenings in the ends or "tails"; perforations scalariform, often with as many as 25-35 bars; inter-vessel pits scalariform, with a wide border and a narrow elliptical to slit-like orifice; pits at ray crossings relatively large, oval to elliptical in shape. Wood rays heterogeneous, erect cells usually restricted to 1-2 marginal rows. (Figure 30.)

Hard Maples Including:

SUGAR MAPLE *Acer saccharum* Marsh.
BLACK MAPLE *Acer nigrum* Michaux.

Vessel segments short, often only 2-3 times longer than broad; generally with spiral thickenings; perforations simple; inter-vessel pits crowded, hexagonal, with a broad border and nearly horizontal slit-like to narrowly elliptical orifice; pits at ray crossings large, angular to broadly oval, more or less crowded. Fibers thin- to thick-walled, occasionally pitted. Wood rays homogeneous. (Figure 31.)

Soft Maples Including:

SILVER MAPLE *Acer saccharinum* L.
RED MAPLE *Acer rubrum* L.

Vessel segments generally 10 or more times longer than broad; spiral thickenings prominent; perforations simple; inter-vessel pits crowded, hexagonal, with a broad border and nearly horizontal slit-like orifice; pits at ray crossings large, angular to broadly oval, more or less crowded. Fibers thin- to thick-walled, with narrow slit-like bordered pits. Wood rays homogeneous. (Figure 32.)

Basswood *Tilia glabra* Vent.

Vessel segments short to long, with spiral thickenings; perforations simple; inter-vessel pits hexagonal, with a broad border and nearly circular orifice; pits at ray crossings small, nearly circular, somewhat crowded, usually resembling normal bordered pits. (Figure 33.)

Black Gum *Nyssa sylvatica* Marsh.

Vessel segments mostly extremely long, without spiral thickenings; perforations scalariform, with 20-50 thin to relatively thick bars; inter-vessel pits oval to elliptical, with a broad border and oval to elliptical orifice; pits at ray crossings oblong, angular or oval, often crowded. Fibers thin-walled for the most part, with minutely bordered pits. Wood rays heterogeneous. (Figure 34.)

Preparation of Material for Comparison

The slight variations between the shape and arrangement of the ray-crossing pits, especially in the coniferous woods, makes it difficult to describe them in sufficient detail to indicate clear demarkations between species. Consequently photomicrographs are here presented as supplements to the descriptions. But it must be borne in mind that while the ray crossings selected for presentation are quite typical they do not cover the variations possible within any given wood. The logical procedure in an analysis of an unknown sample is (1) to determine the species present by means of the keys and photomicrographs, and (2) to check this tentative identification through comparison with material of known origin. It is well for the technician to have a supply of authentic material already macerated for such comparisons. These stocks may be prepared as follows:

Pieces to be macerated should be prepared so that they are one-half to three-quarters of an inch long and about as large as a match stick. More uniform maceration will result if the pieces are alternately boiled and cooled until they sink in water, but this procedure is not prerequisite. A test tube should be quarter-filled with such pieces, and then be half filled with concentrated nitric acid, to which is added a small amount of powdered potassium chlorate. The speed of the reaction may be controlled by the amount of chlorate added and by the temperature. If the mixture is heated until bubbles are evolved the pieces of wood should be bleached within five or ten minutes. Thorough washing with water to remove the excess acid is followed by transfer to a stoppered vial or bottle. Vigorous shaking will separate the material and produce a fiber suspension.

The translucent nature of the cell wall of fibers permits the passage of light to such an extent as to obscure the finer structural details. This may be overcome by dyeing or staining the fibers. For temporary work ordinary writing fluid or fountain pen ink is admirable. A drop or two of this is drawn under the cover glass of a water mount of the sample or the authentic comparative material with a piece of absorbent paper. After a few moments the excess ink is removed by drawing a few drops of water under the cover glass. The preparation of permanent mounts of fibers is not within the scope of this article. The reader will find such technique in any of the standard books on the microtechnique of plant tissues.

In spite of the care with which his work is done, the beginner in fiber identification will be disappointed in the separation which can be made between certain woods. The slight structural variations in many woods will not permit distinguishing one from the other, especially if they be closely related botanically. Under some conditions, the characteristics by which certain species are normally separated are found to be indistinct. This is especially true of the bordered pits connecting the ray tracheids and the fibers. These pits are small, and the swelling of the fiber wall during cooking and beating is apt to obscure them. Careful staining and manipulation of the microscope to give greatest contrast between different thicknesses of fiber wall are necessary if these structures are to be seen.

KEY TO PULPWOODS OF THE WESTERN UNITED STATES*

1. Vessel segments present; inter-vessel pits crowded, somewhat hexagonal; perforation simple..... **Northern Black Cottonwood**
1. Vessel segments not present; fibers with conspicuous bordered pits present..... 2
2. Ray crossing pits occupying over half of the contact face 3
2. Ray crossing pits occupying but a small part of the contact face..... 5
3. Inter-fiber pits in uniseriate or staggered rows, occasionally paired in the springwood fibers..... **Western White Pine**
3. Inter-fiber pits commonly paired or in 2-3 staggered rows in the springwood fibers..... 4
4. Ray crossing pits usually paired but varying from 1-4, nearly circular; ray tracheids not dentate..... **Sugar Pine**
4. Ray crossing pits usually 3-4 per contact face, but varying from 1-6; ray tracheids dentate... **Ponderosa Pine**
5. Fibers with spiral thickenings..... **Douglas Fir**
5. Fibers without spiral thickenings..... 6
6. Inter-fiber pits frequently in 3-4 rows in the springwood fibers; ray crossing pits usually 3-5 per contact face..... **Redwood**
6. Inter-fiber pits usually in uniseriate or staggered rows 7
7. Ray tracheids present..... **Engelmann Spruce**, **Sitka Spruce**, **Western Hemlock**, **Western Larch**
7. Ray tracheids absent..... **Lowland White Fir**, **Silver Fir**, **Noble Fir**

KEY TO PULPWOODS OF THE EASTERN UNITED STATES*

1. Vessel segments present..... 2
1. Vessel segments absent..... 15
2. Vessel perforation simple (without cross-bars). 3
2. Vessel perforation scalariform (with cross-bars) 9
3. Vessel segments with spiral thickenings, at least in part 4
3. Vessel segments without spiral thickenings..... 6
4. Inter-vessel pits crowded-hexagonal, orifice slit-like or narrowly elliptical; pits at ray crossings large, angular to broadly oval, more or less crowded 5
4. Inter-vessel pits rounded-hexagonal, orifice circular pits at ray crossings small, nearly circular, somewhat crowded ..... **Basswood**
5. Spiral thickenings prominent; pits on fibers distinct.. **Silver Maple**
5. Spiral thickenings rather indistinct, apparently lacking in some vessel segments; pits on fibers occasional..... **Sugar Maple**, **Red Maple**, **Black Maple**
6. Inter-vessel pits scalariform..**Cucumber Magnolia**
6. Inter-vessel pits oval, circular, or hexagonal... 7
7. Some of the vessel segments broader than long; fibers thin-walled ..... **Chestnut**
7. Vessel segments all longer than broad; fibers thin or thick-walled 8
8. Inter-vessel pits sparse, not crowded, round to oval; fibers mostly thick-walled..... **Beech**
8. Inter-vessel pits numerous, crowded, hexagonal; fibers mostly thin-walled.....**Eastern Cottonwood**, **Swamp Cottonwood**, **Aspen**, **Largetooth Aspen**, **Black Willow**
9. Bars in perforations of vessel segments usually less than 10 10
9. Bars in perforations of vessel segments usually more than 10 13
10. Inter-vessel pits scalariform..**Evergreen Magnolia**
10. Inter-vessel pits circular, oval, hexagonal or irregular 11
11. Bars present in all vessel segments; orifices of inter-vessel pits horizontally elongated..... **Tulip Poplar**
11. Bars present only in the narrower vessel segments; orifices of inter-vessel pits angular to oval..... 12
12. Some of the vessel segments broader than long; fibers mostly thin-walled..... **Chestnut**
12. All of the vessel segments longer than broad; fibers mostly thick-walled..... **Beech**
13. Inter-vessel pits scalariform; some of the vessel "tails" with spiral thickenings..... **Red Gum**
13. Inter-vessel pits oval or elliptical..... 14
14. Inter-vessel pits crowded, extremely small, with narrow border and slit-like orifice... **Yellow Birch**
14. Inter-vessel pits not crowded, oval to broadly elliptical, with broad border and oval to elliptical orifice ..... **Black Gum**
15. Ray crossing pits windowlike..... 16
15. Ray crossing pits otherwise..... 17
16. Inter-fiber pits in uniseriate or staggered rows, present on tangential walls in summerwood fibers; ray tracheid cells not dentate..... **Northern White Pine**
16. Inter-fiber pits frequently paired, absent from tangential walls of summerwood fibers; ray tracheid cells dentate..... **Norway Pine**
17. Ray crossing pits occupying about half of contact face; ray tracheids dentate..... **Jack Pine**, **Longleaf Pine**, **Shortleaf Pine**, **Slash Pine**, **Loblolly Pine**
17. Ray crossing pits occupying small part of contact face; ray tracheids, if present, not dentate..... 18
18. Inter-fiber pits frequently in horizontal rows of 2-3 in the springwood fibers; ray crossing pits lens-shaped, somewhat distant..... **Bald Cypress**
18. Inter-fiber pits in uniseriate or staggered rows, occasionally paired 19
19. Ray tracheids absent..... **Balsam Fir**
19. Ray tracheids present..... **White Spruce**, **Red Spruce**, **Eastern Hemlock**, **Tamarack**

* The character of the ray tracheid walls is used in the key as additional data when identifying mechanical pulps.

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Testing Water Resistance of Paper and Fiber Board

Several years ago the National Bureau of Standards developed a simple test for the water resistance of paper, but not until recently did it develop the technique of applying the test to very resistant papers and fiber boards. The test consists of sprinkling a water-sensitive powder, composed of a mixture of pulverized sugar and dye, on one surface of the sheet and wetting the opposite surface. The time required for water to pass through the sheet in sufficient amount to color the indicator powder is a measure of the relative water resistance.

The more recent developments in the technique of the methods involve sealing a transparent, moisture-proof cover over the indicator powder and sealing the edges with wax so that no moisture can reach the indicator except through the specimen, and so that once there, the moisture cannot evaporate and escape action on the indicator powder.

Technology of Photographic Basepaper Production

By DR. TH. BENTZEN

MAKING paper for photographic use from furnishing the beater in the paper mill to the finishing manipulations in the dark rooms of the emulsion plant may be subdivided into three main processes, namely: the making of the basepaper; the coating of the basepaper with barium sulphate; and the coating of the baryta paper with an emulsion sensitive to light.

The products of the first two processes represent what the emulsioner regards as basepapers, classifying them as raw paper and baryta paper. Artistic taste of late leads back to the photographic paper of about fifty years ago, a high grade smooth basepaper without baryta coating, which evades the often too vulgar gloss or the still worse starchy flabbiness due to the subjacent baryta layer. Such a basepaper (raw paper) possesses the quality of resistance to mechanical influence (friction) which the baryta coated paper lacks, but it does not present details and contrasts as perfectly as the baryta paper.

Basepaper Raw Material Considerations

Any high grade of fine paper, however, made without watermarks and finished without starch surface sizing is suitable for photographic basepaper. The chief consideration for making it is *the water*, which must be practically pure and colorless, absolutely iron free, very soft, and must not contain any free ammonia, humic acid or hydrogen sulphide. So important is the quality of the water that the supply should be tested regularly at least once every month, as well as after heavy rainfalls, and more frequently during a long-lasting drought.

Rags, sulphite pulp, rosin, aluminum sulphate, etc., the same raw materials as used for making any high grade of fine paper, are needed for making photographic basepaper. One or more average sample of each incoming shipment of these stuff materials as well as chemicals should be accurately tested to maintain quality standards. Rags should be subjected to the copper-ammonium viscosity test and to the mercerization test. Sulphite pulp should be made into test sheets of uniform standard weight and beating times, to determine their folding, tearing, and bursting strength, according to beating time. Aluminum sulphate should be tested for free sulphuric acid and for iron, as it is out of question to use an alum which contains even traces of free sulphuric acid or more than 0.0015-0.002 per cent iron (Fe) or 15-20 parts per million. Rosin should be as clear and bright as possibly available and practically contain no ash.

Of all the fillers for this kind of paper, starch is the most preferable. Starch does not weaken the paper. In addition, it gives the paper the necessary impression, quality of compactness and supports its whiteness. Among the tests which must be made for starch are: reaction (should be neutral but under no conditions, alkaline), sugar (Fehling solution), viscosity, color, and permanence of color in paper exposed to light for a long time.

Starch must never be used as surface sizing for photographic papers but rather only as filler. It should be boiled until the moment of paste formation, and then furnished into the beater.

Preparing the Baryta Emulsion

A defective baryta coating may spoil the very best made basepaper. In fact, many of the faults, especially the rather too often appearing white and black spots, found in finished pictures are due to a poor or faulty coating.

The materials used for baryta coating, of course, should be thoroughly tested by an experienced chemist before going into the production. The most important of the materials for this purpose which are being used constantly are water, gelatin, blanc fixe, and chrome alum.

The water must be of the same purity and softness as required by the paper mill. No water of inferior quality should be used even for rinsing of containers, coating drum or brushes. It is even advisable to use distilled water to be sure that it is ammonia free.

The gelatin must be tested for its melting, and setting point, acidity, viscosity, soaking capacity and color. A high grade gelatin must have a low melting point and a proportionally high setting point. The greater the difference between these two temperatures, the better and more suitable is the gelatin in question for use in baryta coating and also for making photographic emulsions. It must be slightly acid without a trace of sulphuric acid, rather than alkaline; and when soaked and melted in water (1:10) it must be of a transparent and light amber color without any foreign matter visible at the bottom of a beaker after settling. Neither should it contain even traces of iron.

Ground gelatin should never be purchased as the well-known lip-test cannot be made with it.

Blanc fixe (blanc fixe en pâte, the moist precipitation of barium sulphate usually containing from 55 to 70 per cent dry barium sulphate) must be tested for free sulphuric acid. The percentage of dry barium sulphate within it must be determined, and it must be ascertained that the water used to produce the moist blanc fixe did not contain any matter capable of causing infection.

The chrome alum must not contain any iron or free sulphuric acid. A basic chrome alum solution can be prepared by adding ammonium hydroxide, drop by drop, to a ten per cent chrome alum solution (10 parts by weight of chrome alum made up to 100 parts volume with boiling water) just until a faint but stable precipitate is forming; then filter and keep in corked air-tight container.

The preparation of the coating mixture and the baryta emulsion is the chemist's special part of the production. Many different formulae for it are in use by different baryta plants; but one formula, which has always worked, where other combinations failed, may be given as follows:

For the first and second brushing:

Thoroughly knead by hand 25 kilograms of blanc fixe with 8 liters of pure or distilled ammonia free water in a round or oval wooden vat which is not too deep. Then screen to remove all possible lumps, and divide the thinned, uniformly kneaded and sieved blanc fixe into two equal parts, designating them as A and B. To part A add 8 liters of gelatin solution 1:5, to part B add only 2 liters of gelatin of the same concentration.

To prepare the 1:5 gelatin solution soak 2 kilograms of high grade hard or medium hard gelatin in about 4 liters of pure or distilled water and melt without overheating in a waterbath. After melting add water until the total volume is 10 liters. Raise the temperature to 50-60 deg. C. and stir until completely mixed. Then filter through a four-fold cheesecloth.

Preparation and filtering of the baryta emulsion, according to experience, involves some waste, so it is recommended to start with a plus quantity of about 10 per cent.

The hardening of the emulsion to make it resistible to the influence of water requires utmost attention and skill. The use of formaldehyde as a hardening agent is not to be recommended, partly because it will increase the degree of hardness in the course of time and partly because of its close relationship to formic acid. A 10 per cent solution of chemically pure chrome alum is suggested as the very best of all hardening agents.

To carry out this process of hardening requires the services of three workmen, one designated as mixer, another

as hardener, and the third as regulator. The mixer is the responsible foreman and it is his function to knead the first portion of the blanc fixe-gelatin mixture with his hands in a sufficiently large round or oval wooden or earthen ware container. The container should be placed at a height that will permit the hands of the mixer to be in continually alternating contact with all parts of the mixture without unnecessary exertion or discomfort. The chrome alum solution is poured by the hardener into the first portion of the baryta emulsion at the right point as required by the mixer, it being practical to pour it from bottles of known contents according to desired quantity per mixing.

The second portion of the baryta-gelatin mixture at a temperature of 50-55 deg. C. is made ready for instantaneous action by the regulator. It is good practice to keep a bucket filled with this emulsion upon the edge of the mixing container in readiness to let some of its contents flow into the mixture under preparation at the instant that the mixer feels that the emulsion is getting over-hardened.

It should be pointed out that it is very difficult, or rather impossible to restore an over-hardened baryta-emulsion. Should it happen that not enough of the second portion of the emulsion is available, then hot water in the smallest quantity possible must replace it.

To the emulsion is now added 1½ liters of chemically pure glycerin, which makes it ready for the first and second coating.

An easy test to learn whether this emulsion is satisfactory is to observe whether the mixer has any serious difficulties in washing the dried emulsion from his hands and arms. If he has, then it will form a coating which has the necessary resistance to be exposed to the picture maker's treatment.

The finished baryta emulsion should amount to 45 liters, but should amount to a little more because of the mixer being forced to add more water than prescribed, more of the emulsion must be used by the coater to obtain the right coating thickness.

Coating the Basepaper

The coating machine operator must keep both sides (left and right) of the paper equally thick and uniformly coated; and must see to it that no brush marks are visible. At the same time, the coat cannot be allowed to run or slide upon the paper hanging in the loops, a condition which would cause respectively a thicker layer at the bottom or a more or less cloudy, heterogeneous coating.

Neither must the weight of the drying paper cause stick marks. To prevent such marks it is suggested that during the drying period the position of the paper upon the sticks be changed by pulling the loops manually rather than having the sticks through turning do it mechanically.

The coating machine operator is also responsible for seeing that the paper in the hangers is uniformly dried, and that the paper is rewound in the right state of dryness, not so moist that it will wrinkle, and not so dry as to lose the moisture necessary to obtain the high surface quality of the following coating. He must also leave the drum and brushes as well as pan and felt perfectly clean when work is finished, and this equipment must be in the same condition when a new run is started. The operator, of course, must have helpers, but he alone is the sole responsible. He must, therefore, select his helpers according to his own judgment and they must obey him unconditionally.

The coating temperature must be controlled at 40 to 45 deg. C. for each of the three coatings, and the coating speed should approximate 30 to 50 meters per minute.

Each of the three coatings should add 12-15 grams dry weight of the emulsion upon the paper per square meter or a total of 35-45 grams. Some coating plants, however, are adding as much as 50-65 grams per square meter, which is not believed necessary or advisable.

In cases where a cheaper paper is desired, two coatings must suffice. They must be applied as well as possible to make up for the preferable three. Such paper, nevertheless, cannot be made to be as good as the regular three-coated.

It is the third coating which gives the paper its gloss and whiteness. The emulsion for this coating can be prepared in two different ways. Either have a sufficient quantity of the first portion of the previously mentioned emulsion (Part A) available and in it thoroughly knead 500-600 grams of blanc fixe for each liter; or make a fresh emulsion prepared according to the following formula: thoroughly knead 30 kilograms of blanc fixe with 10 liters of pure or distilled water and sieve. Then thoroughly knead the screened portion with 10 liters of gelatin solution 1:5. Harden with 1 liter of chrome alum solution 1:10 and finally add 2 liters of chemically pure glycerin.

Adding more gelatin produces a dull finish coating, whereas less gelatin will render it more glossy; but blanc fixe of different coarseness makes it possible to obtain any degree of glossy or dull surface, although it is usually preferred to coat dull finish emulsions upon glossy paper.

As stated previously, the third coating gives the paper its whiteness. To obtain this desirable quality, however, requires that some blue and red dyestuff be added to the emulsion. These pigments must be added with utmost care. Otherwise, an uneven distribution is apt to cause a disturbing appearance. The quantity of the individual dyestuff needed naturally varies more or less with the shade desired.

At the same time, the pigments must remain permanent and unchangeable to acids, alkalies, and light. Preference might be expressed for Paris blue, which before the war was called Prussian blue, and for carmine. It should be mentioned that carmine itself is not permanent to light, but it is practically safe when mixed with the blue.

To make up the blue dyestuff pastes, one kilogram of Paris blue should be stirred to a homogeneous mixture with 10 liters of pure or distilled hot water to which oxalic acid has been added to dissolve the pigment. After repeated stirring the mixture should be left to settle, and the clear solution decantered and passed through manifold muslin.

Then this blue solution should be thoroughly kneaded with 10 kilograms of blanc fixe, some water added, and the whole allowed to stand until the blue has precipitated upon the blanc fixe and the overstanding water has turned colorless. At this point, the water should be decanted, and if the precipitate is reacting acid, neutralize it with a solution of sodium carbonate. The finished dye preparation should then be drained as far as possible upon a bag filter or filter cloth, and transferred into a stone jar and stored, well covered, in a dust-free and cool place.

The formula for preparing the red dyestuff solution consists of grinding 100 grams of carmine with water and then adding 50 cc. of ammonium hydroxide. To this solution add distilled water to make up a total volume of 3 liters, and, as soon as completely mixed, filter through manifold muslin.

Thoroughly mix the filtered solution with 5 kilograms of blanc fixe, and knead with 5 liters of water. Then add a solution of barium chloride in small portions until the overstanding water is only lightly tinted; mix thoroughly; filter through strong filter paper or filter cloth; rinse thoroughly and let the precipitate drain as far as possible, and store it as described for the blue preparation.

The quantity of each of these dye-pastes to be used depends upon the shade of color desired for the paper. For a bluish coating, about 45 liters of the baryta emulsion, 1000 grams of the blue paste, and 200-300 grams of the red paste may be considered as normal proportions. The color pastes, of course, must be thoroughly kneaded into the baryta emulsion until uniformity of color has been completely obtained. This kneading prevents all troubles from uneven coloring.

Calendering the paper between different coatings is not to be recommended. The calendering should be done only after the third or last coating, and, if necessary, the stock should pass the calender more than once.

The metal rolls of the calender must be kept stainless and bright. The paper rolls must not be exposed to suffer any kind of impressions caused by lumps, wrinkles, folds, tears, or joinings where paper is pasted together.

Should one or more of the paper rolls, however, be injured by a paper defect, it can be restored by the application of soft alkaline soap, to the defected spots or places, the soap being left there until the impressions are abolished, whereupon it should be washed off. It should be understood, nevertheless, that such accidents must be prevented as far as possible, as they do not improve the quality of the rolls.

Previous mention has been made to the paper of about fifty years ago, and which is coming into fashion again. This paper will hardly supplant the baryta coated basepapers of today, but a little information on producing the particular coating for it would not be amiss. A certain kind of coating is necessary to prevent the photographic emulsion from sinking too far into the basepaper or even penetrating to the back side.

The following formula is suggested as the preferable one to produce it:

Soak 450 grams of soft gelatin in 22 liters of pure or distilled water which has been thoroughly mixed with 200 cc. of chemically pure glycerin. When perfectly soaked, melt it in a waterbath at 45-50 deg. C., and add carefully and in small portions 22 liters of pure alcohol of 90-95 deg.

This coating should be applied in the paper mill in the same manner as fine paper is tubsized, but with diminished pressure. This treatment coats the paper on both sides, a characteristic which will prevent thin paper from curling. Some operators, however, apply it to only one side of the sheet (of course the picture side), the photographic emulsion coating machine being adjusted to a short ascent and equipped with a light hard rubber press roll on top.

A cheaper formula for producing a similar effect consists of soaking and melting 500 grams of hard gelatin in 11 liters of pure or distilled water, and then carefully adding 200 cc. of pure alcohol at 90-95 deg. C.

To give this paper as well as any other high grade fine paper the uniformity which distinguishes especially some English papers, it must pass through a rewinding and moistening machine of special construction.

Simple Tests for Quality

To test baryta paper for its capacity to resist the chemical and mechanical influence to which it is exposed in production requires only a high glass cylinder, for instance, a 1000 cc. volumetric cylinder, which is nearly filled with pure or distilled water at a temperature of 50 deg. C. The strip of paper to be tested should be a little longer than the depth of the cylinder, but of a width to enable it to hang free in the cylinder without touching the wall. The strip should be placed in the cylinder with the help of a glass rod so that it hangs straight downward in the hot water for about five minutes. After this soaking the paper should be moved slowly up and down at least ten times without touching the cylinder. The coating should withstand this test without any indication of dissolving. Such a strip should then be hung free in a temperature of 15-20 deg. C. until it is completely dry. If, after drying, it presents practically the same appearance as an untested piece of the same paper, it may be regarded as high grade with respect to resistance.

To determine the possible presence of iron or copper, two sufficiently large and deep, square-formed glass or enamel dishes are required. If enamel is preferred, it must be absolutely free from any defects of uncovered iron parts or spots. Such defects may be repaired by applying a thick covering of asphalt lacquer.

Into one of these dishes place a 1 per cent iron free hydrochloric acid solution (100 cc. acid plus 300 cc. distilled water), and a 1 per cent solution of potassium ferrocyanide in another. Then take a sheet of the paper, a little smaller than the dishes, place it in the acid solution for 20-30 minutes. Then without rinsing, only letting the acid solution drip off, transfer the sheet into the dish containing the ferro-cyanide solution, where it should be left for another 20-30 minutes. After removal from this dish the sheet should be rinsed in pure (iron free) water and left to dry in a practically dust-free room. Should iron be present, it will appear upon the front or back surface of the paper as deep blue spots, while copper or bronze will appear as brown ramifications.

To make the testing complete, one sheet of the paper should be coated with photographic emulsion upon the front side and another upon the back side. After drying these test samples should be slightly exposed to light so as to obtain "half tone" shades as through developing and finishing.

A study of the results of these three tests will indicate the causes of any defects that might develop in the paper from the paper mill to the photographer's studio.

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◆ TAPPI Fall Meeting Entertainment Features

T.A.P.P.I. specials will cruise through the Northwest, timed to make a grand sight-seeing expedition into and over the American Rockies. From the train windows, the first glimpse of mountains will come early morning of September 7. At Hysham, to the south of the main line of the Northern Pacific, can be seen the Wolf Mountains, buffalo hunting grounds of the Crow Indians. Then, southwest of Billings, rises the Beartooth Range with Silver Run and Granite Peaks climbing above 9,000 feet into the blue. From Reed Point to Mission, Montana, look north from the train—behold the Crazy Mountains, 11,178 feet altitude, a bold, jagged stroke on the skyline. On September 7, T.A.P.P.I. will penetrate the chasm between Absaroka Mountains on the east and Gallatins on the west —the trains cut into the hills from Livingston and run to Gardiner, gateway to Yellowstone!

On September 8, to take up the mountain story again, at Livingston, the train curtains go up at 6:00 a. m.. Up and over the Gallatins, into Bozeman. The Madison Range to the southwest of Three Forks, from Sappington to Whitehall the dark Tobacco Roots on the south and north the London Hills, peaks parade dramatically past. Particularly thrilling is the Continental Divide of the main range of the Rockies—over the top! Included in the parade of mountains on September 8 for T.A.P.P.I. will be the Gravelly Range, Ruby Range, Snowcrest Range, Blue Mountains, the Highlands, Big Belts, Elkhorns, Anaconda Range, Flint Creek Range, Deer Lodge Mountains, Garnet Range, Sapphire Range, Mission Range. So much for Montana's majestic Rockies; now into Idaho through lovely Cabinat Gorge, the Bitter Root Mountains, the Coeur d'Alenes, the Cabinets and the Selkirks —all by daylight. Arrive Spokane 6:30 p. m. where the members will be entertained at a dinner dance and will then press on to Portland, arriving on the morning of Sunday, September 9.

The tentative outline for entertainment is as follows:

On Monday evening there will be the banquet in honor of the President. At this dinner many prominent people in the paper industry will be introduced. It is expected that many papermakers from foreign countries will be present.

Tuesday will be devoted to the woods trip, during which meals will be served at logging camps in the big timber. This trip will take the entire day, so no program for the evening is being planned in Portland.

On Wednesday there will be a cabaret and dance during which many interesting and unique features will be presented. These will be participated in by the members. There will also be many high-class entertainers from local roadshows, and an excellent musical program is being arranged.

Thursday will be featured by the golf tournament at the Portland Golf Club. There will be dozens of prizes of considerable value, and the Golf Committee under the chairmanship of Sidney Rasmussen will have things so arranged that nearly everyone from the dub to the expert will have an opportunity of collecting prizes. The Portland Golf Club is one of the best in the city and is located in the beautiful Tualatin Valley. It was chosen by the U. S. Golf Association for the Western championships in 1931.

Following the golf tournament there will be an elaborate dinner dance which will conclude the formal program.

Every paper mill in the country should be represented at the T.A.P.P.I. fall meeting at Portland, Ore. An individual invitation has been sent by President Heritage to a leading executive of every company in the United States and Canada. A similar invitation with the endorsement of President K. E. Terry of the Superintendents Association has been sent to every member of that organization by President Heritage and Secretary Macdonald recently attended the Summer Meeting of the Technical and Woodlands Sections of the Canadian Pulp and Paper Association and extended a hearty invitation to the members of those organizations.

This meeting represents an opportunity of a life time. It is well worth the cost and should not be missed. Reservations should be made at once with G. S. Brazeau, Weyerhaeuser Timber Company, 307 N. Michigan Blvd., Chicago.

Summer Meeting of Canadian Technical Association

THE summer meeting of the Technical Section of the Canadian Pulp and Paper Association, held on July 16, 17 and 18 at Montreal and at Windsor Mills, Quebec, was one of the most successful in the history of the Association. The attendance was unusually large, and lively discussions were brought out by the technical papers which were read. The arrangements made for the meeting met with wide approval among the members.

The session opened with a luncheon, at which Mr. W. A. Ketchen of the Fraser Companies was presented with the Weldon medal for his article *Curl in Sulphite Papers* read at the January meeting. After the luncheon, the Section adjourned to the Forest Products Laboratories of Canada, where demonstrations of research equipment were preceded by short talks by members of the staff explaining the functioning and range of application of the various pieces of apparatus. The experimental paper machine was in operation as was a semi-commercial soda and kraft digester equipped with means of cooking at constant concentration of active chemical. Relief from the digester lent a mill atmosphere to the Institute and, incidentally, was noticed by municipal authorities. An improved pattern of screen classifier, separating groundwood into fractions according to fiber length, was shown in operation. A photoelectric opacimeter and a photoelectric device for the determination of consistence and relative fiber area were demonstrated by Dr. O. Maass, Professor of Physical Chemistry at McGill University, and these attracted much attention.

Members of the council and committee men met at dinner on Monday evening and held informal discussions on topics of general interest to the section. Discussion continued to a late hour.

High Speed Grinding

The morning of Tuesday, July 17, was devoted to a demonstration and discussion of high speed grinding. The experimental grinder at the Forest Products Laboratories was operated at normal speed and was then stepped to a surface speed of 5500 feet per minute. Visitors were enabled to inspect the facilities for the control and recording of power consumption, pocket pressure, temperature and production. Dr. H. W. Johnston explained fully the results of a comprehensive study of the effects of stone speed and pocket pressure on production and pulp quality, made by W. Holland, G. D. Jones and himself under the auspices of the Groundwood Committee. It was shown that satisfactory groundwood could be made at the highest speeds attainable with the equipment. Translation of these results to grinders of commercial size was the main topic of the full discussion which followed, since if it is practical to grind at the higher speeds considerable savings in capital charges and labor costs can be realized. The question of the effect of the higher pressures used at high speeds on pulp quality was raised. Dr. Johnston pointed out that groundwoods comparable to various grades of commercial pulps in strength, freeness and screen analysis had been made on the experimental grinder at ordinary speeds and that accordingly there was every reason to believe that the trends shown in this work were truly indicative of what would be found on the mill scale. A vote of thanks to the Groundwood Committee and to the staff of the Laboratories engaged in the project was moved by George Carruthers.

Inspection of Woods Operations

On Tuesday afternoon the Technical Section joined the Woodlands Section at a logging camp of the Canada Paper Co. at Windsor Mills, where they were welcomed by Harold Crabtree. Supper was served in the camp and sleeping accommodation was provided in tents. Paper pillow-slips and paper mattresses ("better than the broke box" according to one member) were a reminder that the market for paper products is not yet saturated. Logging equipment, in particular a heavy tractor making bush roads, aroused much interest, as did a demonstration of felling, sap-peeling and scaling of pulpwood.

Marginal Problems

The formal program for Tuesday evening and the following morning was arranged by a joint committee of the Technical and Woodlands sections and consisted of papers on marginal problems of interest to both sections. Howard Kennedy and F. L. Mitchell acted as joint chairmen at this meeting.

Proposals for a co-operative study of the mensuration of pulpwood block piles were advanced by J. W. Paterson and A. Koroleff, secretary of the Woodlands section. As a preliminary, a questionnaire was read dealing with the factors which should be used for converting block pile volume to wood volume.

The broad question of co-operation between the Woodlands and Technical men and the general management of a mill was taken up by A. Koroleff. Illustrating the closer approach of these departments graphically, Mr. Koroleff showed diagrams suggestive of the chemical formulae for a loose association being transformed into stable ring compound. Passing to more specific problems, the speaker urged that everything possible should be done to iron out the peaks of employment in bush operations. This plea was strongly supported from various points of view in the subsequent discussion.

A bibliographic study of the influence of wood quality on the yield in sulphite pulping, prepared by G. J. C. Potter and F. H. Yorston, was read by the latter. It was pointed out that as a first approximation the yield per cord or per digester is directly proportional to the density of the wood. Yield on the weight basis, however, is subject to somewhat obscure fluctuations depending on the cellulose content of the wood, its physical structure, and on the range of variation in properties of the non-uniform wood in the digester.

Troubles encountered in a groundwood mill using wood which had lain along the river banks for several years were described by L. E. Kendall. Some of this wood was decayed and soft, while much of it had a hard surface which dulled the stones so quickly that sharpening every few hours was sometimes necessary. In order to maintain pulp quality slower groundwood had to be produced with higher power consumption. Paper machines had to be run at lower speeds and production suffered in consequence.

Peeled Versus Drum-Barked Wood

The conference on marginal problems continued with papers on the relative advantages of peeled and of drum-barked wood. The topic was introduced by J. D. Gilmour who described the sap-peeling and shaving of wood and presented estimates of the man-hours per cord required in these woods operations. The speaker and others dealt with the economics of peeling wood from the points of view of labor and of the employer. It was pointed out that barking at the mills is now common practice in Scandinavian countries where formerly most of the wood was received clean at the mill. The opinion of the meeting was divided as to the relative cleanliness of the two classes of wood.

The remaining two papers dealt with the use of sap-peeled wood in groundwood and in sulphite mills. Both authors pointed out that the lower moisture content of sap-peeled wood was mainly responsible for the changes in mill operations which are required in changing over from drum-barked to sap-peeled wood. H. B. McAdam, taking up grinding, stressed the importance of producing a news sheet as free as possible from slivers since slivers have been shown to be responsible for some 40 per cent of press-room breaks. Sap-peeled wood, because it is relatively dry and brittle, gives many shives and slivers on grinding. As a result, screening has to be more

thorough if a satisfactory press-room record is to be achieved. Other troubles encountered in grinding sap-peeled wood were increased foam and slime formation and poorer finish in the sheet. J. B. Jones found sap-peeled wood to be more satisfactory than drum-barked wood for sulphite manufacture, giving a somewhat higher yield, lower screenings, better strength and comparative freedom from pitch trouble. A compensating advantage of the drum-barked wood was that it packed better in the digesters so that increased yield per digester was obtained. It was suggested in the discussion of this paper that the better packing of the wet chips may have been due to local conditions, and that some investigation of the design of chippers should be made, with a view to making chips that settle well from wet or dry wood.

At the conclusion of the session, it was felt that the joint meeting had been most successful in bringing together the two sections and enabling members of each to appreciate the point of view of the other. Thanks were tendered to the many companies who had supplied tents and equipment at the camp and to the individuals whose efforts contributed to the smooth running-off of the program.

After delivery of the technical papers, the section drove to Sherbrooke and inspected a Haug refiner at the plant of the Canadian Ingersoll Rand Company. They were welcomed by Mr. Mignault, president of the Sherbrooke Chamber of Commerce, at a luncheon at the Sherbrooke Country Club. Golfing members spent the afternoon on the club links. This relaxation concluded the activities of the three-day session.

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◆ Albert A. Tanyane

Albert A. Tanyane, general advertising manager of the Loockwood Trade Journal Company, Inc., publishers of the *Paper Trade Journal* and *Lockwood's Directory of the Paper and Allied Trades*, died Wednesday evening, July 25, at the Bowne Memorial Hospital, Poughkeepsie, N. Y., after a protracted illness. Mr. Tanyane made his home in New York at the Hotel Wellington.

Mr. Tanyane was born October 8, 1872 at New Haven, Conn. He attended the public schools of New Haven and entered Yale University in the class of 1895, but did not remain to complete the course. After leaving college, he immediately became connected with the publishing business going, after a brief experience in New Haven, to the Evening Post of Worcester, Mass., of which he became business manager. Later he went to Boston and was connected among other publications with the Boston Herald. In 1909 Mr. Tanyane became the New England advertising manager of the Lockwood Trade Journal Company with headquarters in Boston. He retained this position until 1915 when he was called to New York to become general advertising manager of the Lockwood Trade Journal Company. Mr. Tanyane was married to Hattie Burlingame, who is his sole surviving relative.

A Man on the Machine Looks at Training

By J. O. PARKS

PROMOTIONS were rapid some years ago in a new mill where most of the machine help was native. It was the policy of the company, as they expressed it, to promote from within and to omit "Boomers" wherever possible. There were, however, as always, some few on hand; among them was a boss machine tender who has since risen to the top.

This boss machine tender was a man of keen intellect, long experience, and a pleasing personality. In addition, as an ex-army captain, he was a strict disciplinarian.

In the belief that the fruits of this man's years of experience and study could be given practical application, the company established classes of instruction to better acquaint each man with his job. This decision may have been reached by the company because of the mishandling of equipment and frequent accidents caused by too rapid promotion of employees and consequent lack of experience.

At any rate, this man, selected to advise, outlined the paper machine in its entirety in his instructional work. He began at the winder, because peculiar to the trade the beginner is in charge of the finished product, and followed through to the fourdrinier. He described equipment on the different sections of the machine, showed why each step was essential and what was accomplished by it. Traction and arc of contact were explained thoroughly. Personal safety of the operators was always uppermost in the mind of this instructor, and that spirit was instilled into his pupils.

The result of these classes was a thorough understanding by each man of the details of his individual job, a decrease in number of accidents, and an increase in production. The classes, developed to bridge the chasm between minimum and maximum production rather than to help the men alone, were then discontinued as the object of the work had been attained.

Might one question why a training system similar to the one which has been outlined but more thorough and less elementary and embracing cost of operation as well as efficiency would not be of general benefit?

It is appreciated that many operating superintendents in the past opposed any form of training that would place operators on an equal footing with them in so far as knowledge of operations was concerned. They regarded themselves as dealers in secrets, but with the introduction of technical control some have been forced to recognize that co-operation with others in the execution of duties is of greater benefit than the exploitation of personal glory.

Any method of promotion that would assure safety, eliminate the costly process of breaking in, and give self-confidence to the operator thus promoted would be helpful to the men and economical for the manufacturers. How many superintendents, for example, learn such vital things as proper handling of press rolls in relation to felt life, water removal, and steam consumption at the expense of the firm by which they are employed? A case in point might be suggested where under one superintendent the felt life of a wide, fast machine equipped with suction presses and with top and bottom rolls of rubber amounted to only twelve or thirteen days for a first felt and forty days for a second felt. Excessive weight, far past the maximum water removal point, caused the heads on the first press bottom roll to collapse twice in less than six months and each time required seventy-two hours to replace. This same machine with the presses equipped with the same make of felts, top rolls recrowned, nip pressure reduced, and felts kept clean under the supervision of another superintendent averaged thirty-five to forty days for the first press felt and over one hundred days for the second felt. Such figures indicate the difference between guesswork and facts.

Many experiments are now being tried with fast machines on which production is being pushed to the limit to reduce costs. Yet, in such cases, rarely are the operators taken into confidence even though the success or failure of the experiments often rests with them. Should the operators be sufficiently interested in the results of the work to make individual notes, they might actually be looked upon as chisellers rather than faithful employees.

This condition, although it is general, is more noticeable in going from mill to mill. In such event it is noticed that almost invariably where mills attempt to speed up production and cut down costs, department heads are selected for the task from a more progressive mill.

Doesn't such a choice of men for important work of this kind indicate a laxity on the part of the mill employing them for developing talent within their own organizations and for keeping informed on new methods and ideas? Certainly, many men have ambition and ability to learn; and, if encouraged, can progress in one mill as well as another.

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◆ New Textile Fibre

"Fibro," produced from wood pulp, but specially strengthened so that it can be cut into required lengths and mixed with any kind of cotton from the coarsest to the finest, has been developed as the result of prolonged experiments carried out by Courtaulds and the Shirley Institute. It threatens to become a serious rival to Egyptian cotton in the production of high class textile fabrics. —*Chemical Industries.*

Management and Men

By ARTHUR B. GREEN
Management Engineer

LOOKED upon as signs of business recovery are the disputes and threats of disputes between labor and what is called capital. In the heat of controversy, each side thinks of its own rights as if they excluded the rights of the other side. When the total stake shows some signs of increasing, each side sees danger that the other side may get more than its share of the increase. To both business looks like a grab.

With this delusion, men hold noisy meetings and excite themselves furiously over a strike vote, bent on hurting their own business in order to hurt their adversaries more, while in one of the nation's largest cities a great exposition is drawing people from all parts of the earth, portraying the progress of the past century and proclaiming that industry and science bring blessings and freedom to all men, when viewed over a long span of years.

To business men, industry's advances in technique bring wider fields for profit; to working men it brings more in wages, less in working hours, less bodily danger, and comforts and conveniences otherwise beyond reach. Now, if this trend of the century does not always apply, it applies unmistakably over the long haul, and no blunders of management, no selfish short-sightedness, have ever for long held the trend in check. Should any papermaker doubt it, let him be invited to consider what paper today would cost in toil, in long hours of labor, in money, if it had to be made with the old vat and hand mould of scarcely more than one hundred years ago.

Not a little waste, and hazard, and anguish, might be saved should a way be found to put the day-today moves, the hour-to-hour motives of men in step with the trend of the century. A suspicion grows lately that industry's advances, marked in the direction of tools and mechanical power, have been lacking in management. After all even should papermaking by some magic become wholly automatic, there would still be no escape from the basic fact that management is really a human affair, that industry depends little on what machines do, but depends first on what men do. Machinery, even up to the imaginary perfect and complete robot, has but one effect: to extend the power of the brain and the hand, for on the brain and the hand depends every bit of machinery for its birth and its utilization.

The paper mill shows this perhaps with a sharpness all its own. You stand in the machine room door. Down the production line you look, lined on both sides with heavy rumbling fourdriniers. Fourdriniers date from about 1810. At your elbow howl the jordans. The jordan dates from about 1850. You turn and look back along the line of kerosene-wiped Hollander beaters. Hollanders date from about 1750. And when you have seen all these things you have seen the whole paper mill. And all three of these typical paper mill units sprang up in times when the heads of manufacturing companies had their hands in the stock. In the long years that have passed since, nothing quite so important has happened to papermaking.

If, therefore, machinery is a creature of man, papermaking depends on the men who work at it. Of all the assets that a company can show none can compare with the skill, knowledge, loyalty, and energy, of its men. Last October, in these columns, I ventured to suggest that men mean more to business than the strongest balance sheets in the world. To nothing could management better devote itself than to building a group of men high in skill, knowledge of the work, loyalty to the company, and power. Assets in those working qualities do not vanish, like cash, under a wave of depression, but assert themselves undaunted.

Management that concerns itself blindly with the dead things, because it lacks understanding to handle the living, menaces our business security. Management that sees more to gain by being smart, because it lacks the human aim, is a poor investment. In the *Rotarian* for May is a piece for the ordinary investor by Roger W. Babson, listing eight rules to follow in buying securities. The sixth rule indicates that in Mr. Babson's view, management is not always devoted to man, and warns the investor against tricky management:

"There seems to be a *conscientious* cycle as well as a *business cycle*. There are periods when the government, corporation officials and even the courts become careless and indifferent as to honesty, efficiency, and general righteousness. This becomes so bad that at last there is a complete change in public sentiment and the government, boards of directors, and the courts again insist on honesty, efficiency, and uprightness.

"Here is the rule to follow in connection with management. *The time to buy stocks is when the public conscience is demanding honesty, efficiency, and uprightness in corporation officials and directors.*"

Mr. Babson used the italics.

Mr. Babson may be right in choosing a time of relatively high business morals for investing, but he is obviously not completely happy when he observes that such times are only occasional. Were he able to discover those companies that through thick and thin bend their best abilities to making better men and moulding them into better teams, he might be likely to find companies making money in spite of depression, companies he could advise putting money into. When a management devotes itself to creating good men, well placed, well organized, well directed, it has to be too honest intellectually to employ devious tricks and cunning. It is too busy with the heart of its job.

A certain amount of effort in this direction does go on. Seldom is it taken as management's first duty. Frequently does management try to hire it done. It is classed under the chill term "Technical Control." If you subject your pulps and your papers to laboratory analysis; if you put devices in the mill to gauge how much or how good is the stock at various points along the line of process; if you write down specifications; then you have Technical Control. Then, like the banker who looks over your statement, you view everything *post-mortem*. You accept strain and responsibility in moderate amount, but you are never quite ahead of the game.

Technical Control misses what is basic in every human organization, that men work best when they work from inward desire. Checks and spurs and detections of faults come far short of one hundred per cent when the problem is to have men do their best. That problem calls for inspiration. Instead of waiting until work has been done to gauge the result, learn how it can be done best, make a method of it, and put that method into the hands of the best selected man . . . before he starts, not afterward. Then gauge the work by the method. Look to see how well the actual performance followed the one best method. Let the result be your responsibility, not the workman's. Provide the workman with what is needed to work with. Provide him with guidance that is technically correct from a management that is fingerwise to the art. If he tries and fails, help him, to the end that he will not fail again in the same way. Collect into your method the utmost in knowledge and skill that can go into it. Get the workman's help in collecting this. Have it embody him quite as much as yourself. Then go into partnership with him to improve on it as time shows the possibilities. Bring your skill and his up to the highest pitch that empiricism and science can reach. Then nail it there by putting your method in some form down on paper, while you and he together look for a still better way.

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◆ Senator Lee Endorsed for Renomination

State Senator William H. Lee of Lockport, N. Y., who represents Niagara and Orleans counties in the upper house of the state legislature, was recently endorsed by the Orleans Republican County committee. Senator Lee represents the 47th senatorial district. He is a candidate for renomination and reelection.

Senator Lee is treasurer and general manager of the Lockport Felt Company, Newfane, N. Y.

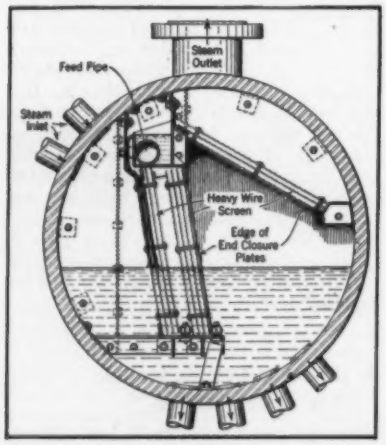
◆ Totally-Enclosed Direct-Current Motors

A new line of direct-current motors, designed for applications where dust, dirt, moisture, or other foreign matter is present in large quantities, has been introduced by the General Electric Company, Schenectady, N. Y. The new motors are totally enclosed and fan-cooled, and are available in sizes from ½ to 200 hp.

A system of dual ventilation is utilized. An internal fan draws the warm air from the windings and core and circulates it around the totally enclosed interior of the motor so that it gives up its heat to the frame and end shields. An external fan draws cool air in through mesh openings in an outer end shield and directs it over the surface of the magnet frame and inner end shields. Close clearances between the end shields and the bearing housings, and grease seals along the shaft, prevent foreign particles from entering into the motor.

◆ Steam Washer

With the object of reducing the solid contents in the steam leaving the boiler and the consequent protection of the superheater and turbine blading, Combustion Engineering Company, Inc., has developed a steam washer for placing within the steam drum.



As shown in the illustration water from the feed box spreads over an initial screen and forms a curtain through which the steam must pass on its way to the outlet at the top of the drum. This washes the steam with the clean feedwater and removes much of the solid content. The subsequent screens through which the steam must pass are for the purpose of removing entrained water. The manufacturer states that the moisture content of the steam leaving the boiler drum is not increased as a result of the washing under these conditions and it is probable that the reduction in film tension actually decreases the tendency to carry over suspended particles of water.

Where all steam from the boiler tubes and water walls enters on one side of the drum a single washer arrangement is employed. If the steam enters on both sides of the drum a duplex arrangement of washers is necessary. This consists merely of a second set of screens on the opposite side of the drum.

◆ Non-Sparking Tools

The Stanley Rule and Level Plant, New Britain, Conn., has placed on the market a line of non-sparking tools for use in situations where production and maintenance work are confronted with explosion and fire hazards. The tools, including among them cold chisels, drift pins, pry bars, screwdrivers, ball pein

hammers, scaling hammers, picks, and sledges are made of wrought Beryllium copper, a copper alloy containing from 2 to 2½ per cent of Beryllium. The manufacturer states that these tools are not only non-magnetic and non-sparking, but they are also almost as durable as steel tools of similar design and size.

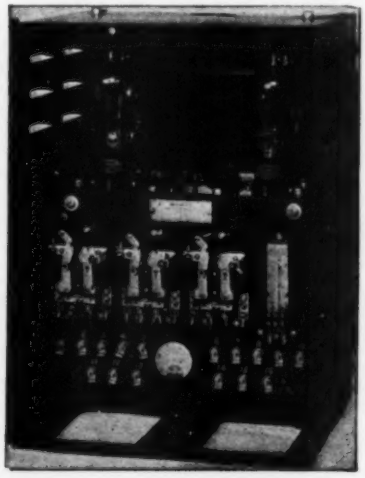
Descriptive catalogue on this new line of tools will be supplied by the manufacturer upon request.

◆ Register Cutter Regulator

The Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., has announced a new register cutter regulator for the high speed cutting of paper, cellophane, cloth and similar materials in accordance with printed matter, labels or other patterns where both forward and reverse correction of the position of the material is required. The equipment preferably is arranged to operate from phototubes, receiving impulses from a spot on the paper. Operation may be obtained also from contacts operated by a small perforation in the material or by a conducting section.

The equipment comprises three units, the photo-troller which contains an amplifier, relays and control equipment, the scanner which consists of a light source, phototube housing and accessories for scanning the paper, and the synchronous selector, a rotary limit switch which selects the direction of the corrective action.

In operation, the synchronous selector is driven by the rotary cutter and makes one or more complete revolutions per cut. The scanner or contacts are mounted so that the spot passing by them gives the initiating impulse. The selector translates the impulse and selects the proper direction of correction. This



translated impulse is then given to the photo-troller which amplifies it sufficiently to operate the two relays, each of which has one pair of make contacts capable of handling 10 amperes at 115 volts a-c. or 2 amperes at 125 volts d-c. These relays control the motors or solenoids which operate the mechanical differential or other device used for correcting the position of the material, the speed changer for correcting the speed of the material, or both. An adjustable electronic timer determines the length of time the differential is operated. If the power requirements of the motors or solenoids exceed the rating of the photo-troller relays, a linestarter should be interposed between them and the motors or solenoids.

◆ Color Analyzer

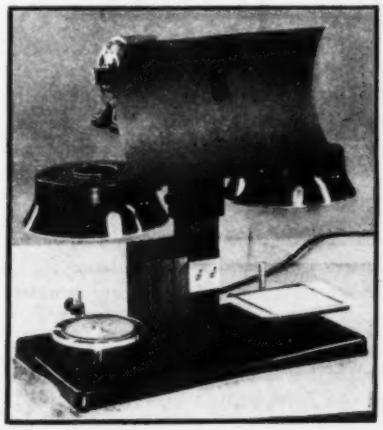
The Bausch & Lomb Optical Company, Rochester, N. Y., has announced an instrument for the analyzation of color according to its psychological attributes of hue, saturation, and brilliance. The instrument is designed for use with standard Munsell color discs, based on the well-known Munsell system of color nomenclature.

In the analyzer a prism system with proper lenses gives a circular photometric field divided vertically. Light for one-half of the field comes from the surface of the Munsell discs, and for the other half from the surface of the sample to be measured. The optical system is so diaphragmed that only light that is reflected from the two surfaces reaches the eye. Illumination for sam-

ple and discs is provided by means of specially designed lamp houses directly over each. Each lamp house carries four frosted auto headlight bulbs, the lamps being operated in parallel from an integrally mounted transformer. The lamps are mounted in the form of a square, the reflected beam passing upward through the center of the square to the photometer. The viewing direction is approximately perpendicular to the sample surface. The lamps are symmetrically positioned and slightly off the vertical axis, so that specular reflection from the illuminated surfaces cannot enter the optical system of the photometer. Each group of four lamps is adjustable in a vertical direction for the purpose of balancing the illuminations on the sample plane and the disc plane, or the two groups can be adjusted as a single unit.

The system has been so designed optically that the actual rotation of the discs for integration of the colors is avoided. In the left-hand light path there is placed a prism, the rotation of which causes a circle to be scanned upon the disc surfaces. The prism is mounted in the hollow shaft of an especially designed A. C. induction motor of the shaded pole type. This motor is mounted directly in the optical path and the light beam passes along its axis of rotation.

With this system of scanning the stationary discs, complete adjustment is made in a very short time, since one simply views the photometric field and alters the sectors of the four stationary discs until a satisfactory match is secured. The percentage values of the



sectors are then read on the graduated circle upon which the discs rest and are used in the formulae previously given. A central and a peripheral clamp hold the discs loosely upon the table.

The sample table is square and carries a spring clamp which holds the specimen in a smooth horizontal position. When liquid materials are being measured, they may be placed in a shallow Petri dish and set centrally upon the sample table, inside the spring clamp. In the optical system on the sample side there is a negative lens mounted in a slide so that it may be introduced into the light path at will. The purpose of this lens is to provide for a larger field of view where a sample is of uneven color. With the negative lens out of the system, the specimen field covered is approximately one inch. With the negative lens in, the field covered is approximately three inches.

There is provided with the instrument a basic series of discs. This series is intended for the experimental work necessary to make a choice of the particular discs which will be most advantageous for measurement of a given group of colors. It includes only those discs of maximum saturation and greatest brilliance in each of the ten hues of the system, together with a selected set of neutrals.

Among the special advantages claimed for this type of color analyzer are: correlation with psychological response; numerical values for all three attributes of color; possibility of reconstructing and viewing any given color from numerical data; and color matching is done in total—not by sections of the spectrum.

◆ Gurley R. D. Smoothness Tester

A new paper testing instrument, known as the R. D. Smoothness Tester, has been introduced recently by W. & L. E. Gurley, Troy, N. Y.

The tester was developed to permit a mechanical measurement of the smoothness of paper by utilizing surface porosity or the rate at which air flows through the inequalities in the surface of the paper as the unit of measurement. Essentially, the tester consists of two circular blocks having a cross-sectional area of 1 square inch. The contact surface of each is lapped and polished optically flat, and the sample is placed between the two surfaces.

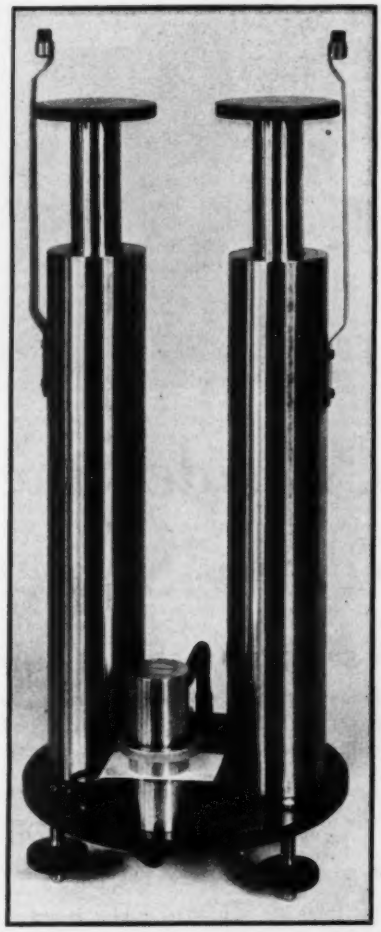
The paper is subjected to a pressure of one-half pound weight by the top block. It is also centrally subjected to an air pressure of 12 inches of water, equal on both sides of the paper.

Air then passes outward between the paper and the test block, due to the inequalities of the sheet. A measurement of the time (in seconds) for a 5 cc. air flow is taken as a measure of the inequalities of the sample, and indicates the "finish."

The means for developing air pressure at the sample held between the two polished surfaces consist of two identical cylinders, containing mercury, in which are floated two cylindrical cups, having the top ends closed. They develop equal air pressures and automatically maintain it practically constant throughout the period of the test. The inner cylinders have 5 cc. graduation, so that the time may be measured for known air flows.

Two leveling screws, together with a small circular spirit level which is mounted on the base, serve for leveling the instrument. Stainless steel is used for the cylinders and the races of the ball bearings which guide the inner cylinders.

In operating the device, the two inner cylinders are raised, and are held in the raised position by means of catches which engage them under their rims. The sample of paper is then placed between the blocks, the top block resting concentrically over the bottom one. Then the inner cylinders are released, thus developing equal air pressures on both sides of the sample. The graduations on the inner cylinders are timed as they pass the top surface of the outer cylinders. Thus, the time for the passage of a known quantity of air is measured. The time becomes greater as the finish is higher.



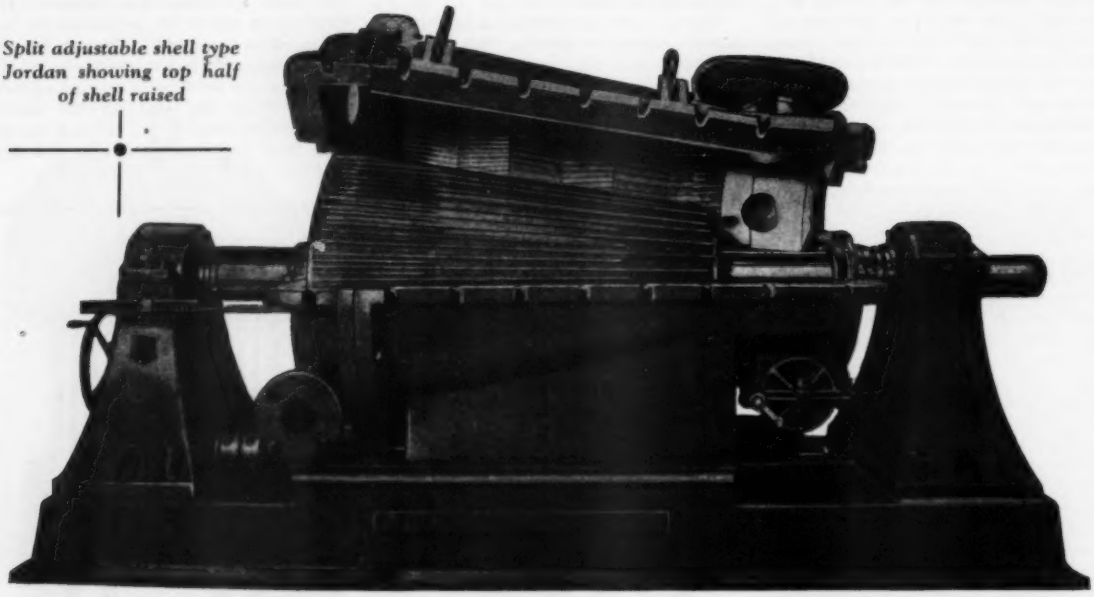
Average results from individual tests on ten samples should be obtained for the specific grade of paper under test. Constant humidity conditions are preferable.

Analagous results are said to be obtainable on duplicate instruments. The construction of the instrument is precision work, with the block surfaces tested against a perfect surface, such as an optical flat, and then against each other to show no air leakage. The cylinders must also be identical, both in diameter and weight.

Among the advantages claimed for this instrument by the manufacturer are:

Both the wire and felt sides are measured at the same time; low unit pressure is applied to the sample, thus caus-

PRECISION BUILT



Split adjustable shell type Jordan showing top half of shell raised

Consider these IMPORTANT FACTORS *when Selecting Your New* JORDAN

• SPLIT ADJUSTABLE SHELL

Saves time and labor when examining, cleaning or refilling. Saves space by eliminating the old troublesome method of pulling the plug horizontally.

Assures duplication or continuation of desired Jordaning results by precision shell adjustment to thousandths of an inch.

• *Non-Adjustable* BANDLESS PLUG

Increases life of fillings, as plug is mounted on stationary anti-friction bearings, eliminating all plug play and keeping plug in perfect alignment with shell.

Stationary anti-friction bearings allow plug to be easily interchanged and eliminates vibrations and weaving formerly caused by looseness between sliding bearings and their guides. Saves time and money in refilling because of bandless type plug (no extra charge for this type filling).

These modern features combine to give that operating efficiency which produces a more uniformly Jordaned stock, as well as important operating and maintenance economies, needed to assure excellent returns on the investment.

Further particulars are described in our illustrated Jordan Catalog. A copy will be gladly mailed upon request.

Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of High-Grade Machinery for Paper Mills

ing no change in its finish; portability; ease and simplicity of operation; short testing period; simplicity of design and construction; and analagous results obtainable on duplicate instruments.

◆ Mead Corp. Acquires Wheelwright Mill

The Leominster Mill and the business of the Geo. W. Wheelwright Paper Company have been acquired from the Receivers by the Mead Corporation, who will operate the business through a subsidiary company, the Wheelwright Paper Company. The new owners will continue the manufacture of Index Bristols, Printing Bristols, Blanks and Specialties.

George W. Wheelwright, whose family has been identified with the enterprise for many years, is an officer of the new company, and will actively direct the business.

As in the past, the sale of Wheelwright Bristols and Book Papers will be handled exclusively by Wheelwright Papers, Inc., 230 Park Avenue, New York City.

◆ Improved Paper Mach'y Corp. Adds to Sales Staff

The Improved Paper Machinery Corp., Nashua, N. H., manufacturer of pulp and paper making machinery, announces the appointment of John H. Noble of Pelham, N. Y., as sales manager.

Kenneth B. Hall, Portland, Ore., has been appointed Pacific Coast representative for IMPCO equipment.

◆ A.F.Brosky Now With Jeffrey Mfg. Co.

The Jeffrey Manufacturing Co., announces the appointment of Alphonse F. Brosky as special engineer attached to its general offices at Columbus, Ohio.

To accept this position, Mr. Brosky has resigned as consulting editor of *Coal Age* having served in various editorial capacities on the staff of this publication from 1921 until the past winter, when he acted as Assistant Fuel Advisor to the Federal Surplus Relief Corporation in Washington.

◆ Duriron Company Enlarges Plant

The Duriron Company, of Dayton, Ohio, manufacturer of acid and alkali handling equipment, has started construction of an extension to its alloy steel foundry which just doubles the size of the present plant.

Construction work is being pushed ahead as rapidly as possible and the new equipment will be installed as soon as the extension is under cover. Additional electric induction furnaces will be installed for the production of Durimet and Durco Alloy Steels and other chromium-nickel alloys.

The addition to the plant is necessitated by demand for manufacturing space to take care of the increased alloy steel business which the company has been experiencing for the past several months.

◆ New Catalogues and Publications

American District Steam Co., North Tonawanda, N. Y.—Bulletin No. 211 is devoted to the ADSCO Piston-Ring Expansion Joint for piping installations. The principles of construction, application and method of operation of this expansion joint are briefly but concisely covered and a number of tables contain interesting data. Copies upon request.

Babcock & Wilcox Co., New York—Details of the design and construction of the B & W Integral-Furnace Boiler, as well as operating characteristics of several installations are contained in a new twenty-page fully-illustrated booklet recently released. Copies upon request.

Bakelite Corporation, Bound Brook, N. J.—A new booklet entitled "Bakelite Synthetic Resins for Paints and Varnishes" reveals the wide variety of Bakelite Resins which are available for the manufacture of specialized finishes. It is written in non-technical style, and copies may be had upon request.

Duriron Co., Dayton, O.—A new bulletin has just been received from this company covering centrifugal pumps for acids and alkalies. It covers a new series of pumps just brought out and gives the general construction. Separate inserts will be issued on each pump giving the capacities, dimensions and rating charts. Included in the general bulletin is a brief analysis of the different corrosion-resisting alloys in which the pumps are procurable. Copies may be had by asking for bulletin No. 172.

Illinois Testing Laboratories, Inc., 141 W. Austin avenue, Chicago—Bulletin No. 1726 illustrates and describes the Alnor Pyroll Pyrometer for measuring surface temperatures of revolving rolls or driers. Another bulletin, No. 1727, covers the Alnor Pyrocon Combination Pyrometer and Type 1755 Pyrometer for measuring surface temperatures of flat surfaces, such as molds, dies, platens, plates and other similar surfaces either metallic or non-metallic. Copies on request.

Improved Paper Machinery Corp., Nashua, N. H.—The latest bulletin issued by this company covers Impco Vacuum Filters. The text gives a very comprehensive description of these filters, taking up the features of construction, adaptability and operating results. The bulletin is illustrated with colored halftones. Copies on request.

Ingersoll Steel & Disc Co., 310 S. Michigan avenue, Chicago—Typical applications of the use of stainless clad steel in the paper industry where corrosion resistance is of primary importance, are illustrated in a 16-page booklet just issued by this company, which is a division of Borg-Warner Corp. The title of the booklet is Manual of Welding and Fabricating Procedures for IngAClad Stainless Clad Steel. This booklet is intended to serve as a guide, and all types of welding and fabricating procedures are fully described and diagrammatically illustrated. There are a number of photographs of actual installations showing the applications of IngAClad through a wide range of industries.

Link-Belt Company, Chicago—The following new publications have just been released by this company: A new 32-page illustrated catalogue, No. 1415, with horsepower and other engineering data, dimension diagrams, etc. This book covers single, double and triple reduction units of herringbone gear type; also a full line of flexible couplings. Also a 16-page illustrated catalogue, No. 1595, on Locomotive Cranes, in which tables of clearance dimensions and rated lifting capacities are given for machines for operation by either a gasoline, Diesel, electric, or steam driven power unit. The book includes not only standard gauge machines but also cranes for operation on wide gauge tracks and for use at radii as large as 100 feet. Another 16-page catalogue, No. 1462, is devoted to the company's line of vibrating screens. Unbalanced-pulley as well as positive drive types of screens are covered, including a positive drive screen for operation at a flat angle, making it suitable for use in places where the headroom is limited. Several types of dust enclosures are included, with dimensions for laying out an installation. Copies of these catalogues on request.

Manhattan Rubber Mfg. Div., Passaic, N. J.—The 1934 edition of the V-Belt Engineering Data Book has just been published by this company, a division of Raybestos-Manhattan, Inc. Chapters on Selecting a V-Belt Drive, Design of Special V-Belt Drives and others are included, in addition to numerous standard tables, charts and belt and sheave list prices. Copies on request.

Medart Company, St. Louis, Mo.—A 24-page loose-leaf booklet termed "The Medart-Timken Engineering Journal," covers complete specifications, dimensions, load ratings and other valuable information on the four series of Medart-Timken Bearings which are now being furnished in a large number of types of standard housings. Copies on request.

National Paperboard Ass'n, 608 South Dearborn street, Chicago—The Standards Adopted by Members of this association, effective July 1, 1934, are now available in booklet form. Copies may be had from the Chicago office, or New York office, located at 41 East 42nd street.

Pennsylvania Pump & Compressor Co., Easton, Pa.—Two new catalogues have just been received. One covers the company's line of Multi-Stage Centrifugal Pumps. The text is comprehensive and is amplified by a number of diagrammatic sketches showing principles of construction and operation, and the book is well illustrated. Another catalogue is devoted to Penn-Motor Pumping Units. In addition to general information and illustrations, there are also Head Capacity Tables with motor size for these pumping units.

Prat-Daniel Corp., 350 Fifth Ave., New York City—A recent bulletin is devoted to a concise description of the Thermix Multi-Cyclone Dust Collectors. One of the advantages of this Dust Collector as claimed by the manuafcturer, is that a considerable variety of arrangements of cyclones makes it possible to fit most space conditions encountered. Dimension tables are included in the bulletin.

Process Engineers, Inc., 9 W. Prospect avenue, Mount Vernon, N. Y.—Two booklets of interest to many paper mill executives, have just been issued by this company and will be sent upon request. One is entitled Rubber Latex in Paper; the other, White Water in Sizing.

Jos. T. Ryerson & Son, Inc., Chicago—New bulletins recently published are: One on Ryertex Bearings in which the use of these bearings in the Pulp and Paper Industry are enumerated. The other bulletin takes up the subject of Installation, Care and Operation of Ryertex Bearings. Both publications are illustrated and will be sent upon request.

Worthington Pump & Mach'y Corp., Harrison, N. J.—The following new folders have just been issued: Centrifugal Pumps (Types C, CA and CB); Centrifugal Pumps (Single Stage volute, Type R); Centrifugal Pumps (Single Stage, Types D, DA and DB); Diesel Engines (Vertical Four-cycle, Direct Injection).

BOOKS

Bureau of Standards, U. S. Department of Commerce, Washington, D. C.—Two reprints from the Bureau of Standards Journal of Research, vol. 12, are now available in pamphlet form. Research Paper RP681 is entitled "A Sensitive Instrument for Measuring the Air Permeability of Paper and Other Sheet Materials." Research Paper RP682 is entitled "Effect of Experimental Conditions on the Measurement of Air Permeability of Paper." Both papers are by F. T. Carson and may be had from the Bureau for 5 cents each. (Coins, not stamps, should be sent.)

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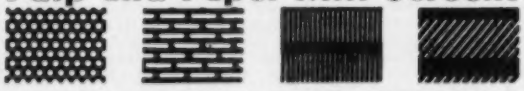

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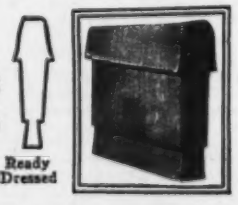

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POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Care of Commutators

Commutators should always be kept clean and well polished. Under normal operating conditions, a commutator will require only occasional cleaning with a piece of canvas or non-linting material. No vaseline or oil of any description should be used on a commutator. In case the commutator has become rough, this roughness may be removed by polishing the commutator with a piece of sandstone, cut to the same radius as the commutator. If sandstone is not easily obtained, sandpaper may be used by pressing it against the surface of the commutator with a block of wood shaped like the sandstone mentioned above. In both cases, the commutator should be run at a high rate of speed during polishing and the sandstone or sandpaper moved back and forth along the surface parallel to the shaft. After this has been done, the commutator end brush faces should be carefully cleaned to remove any grit which might cut or scratch the commutator. Emery cloth should never be used on a commutator or brush.

◆ Avoid Perforated Tubes for Sampling

It is not a good thing to use a perforated sampling pipe for picking up samples of flue gas for CO_2, CO, and O analysis. A perforated pipe will almost invariably give a low reading because the perforations or holes in the pipe become closed up and the gas sample is taken only from one section of the pass. Usually this is from the side, where air leakage tends to be highest and the carbon dioxide lowest.

◆ When Negative Brushes Stick

When the negative brushes on rotary converters stick badly, it is a sure sign that there is some trouble. Usually one can look for flat commutator segments, high mica operations at a power-factor other than unity, or even brushes of improper width. In a recent case the negative brushes fitted badly on one rotary converter, and after looking at the matter from all angles, it was found that the brushes were not located exactly on average neutral.

Another thing to remember is that over-excitation will result in increased armature reaction which will cause a field distortion, which in turn will result in shifting of the neutral.

◆ Economizers

Economizers have their greatest value in plants in which the boilers are forced and mechanical draft is employed. On the other hand, they may result in an actual loss in overall economy when installed in connection with feeble chimney draft and underloaded boilers. Plants in which all or virtually all auxiliaries are electrically operated, hence have little exhaust steam, are improved in economy to a greater extent by the introduction of economizers than are plants in which a good supply of exhaust steam is available.

◆ Aiding Combustion Control

With either an insufficient or excess amount of air supplied to the combustible on the grate, there results a loss of heat; with too little air, combustion is incomplete, CO is formed and the difference in the heat liberated in the formation of CO and that in the production of CO_2 is lost. On the other hand, when excess air is present, while the combustion may be complete, some of the heat liberated is used to raise the temperature of the excess gases to the flue gas temperature and thus is lost. In the regulation of the air supply lies one of the most important means of increasing the amount of heat that may be realized from the fuel.

If furnace conditions remained constant, this regulation would be simple because the amount of air required for a given fuel would be constant. These conditions do not, however, remain the same for more than a few seconds at a time. The thickness of the fuel bed and also its density changes, the demand for steam and the rate of combustion are constantly varying and therefore the rate of feed of both fuel and air must vary. Where no method of automatic control is used the uptake damper is adjusted to supply enough air at maximum load, consequently for any less load there is waste.

There is, in every furnace, a condition of draft over the fire that is fundamentally correct. With this draft, the gases move through the boiler at a velocity permitting of maximum heat absorption. This over-fire draft should be kept constant of such intensity that there is not a heavy influx of cold air through the brick work nor an excessive radiation of heat such as is the case when there is a positive pressure over the fire.

In order to maintain any predetermined over-fire draft, it is necessary first to regulate continually the uptake draft by means of the damper, and second the ash pit pressure must be controlled to compensate for the varying resistance to flow through the fuel bed.

One system of combustion control uses two independent though correlated sources of control; boiler pressure and over-fire draft. Boiler pressure is communicated to a mercury reservoir which forms one leg of a "U" tube. Another reservoir located above the first at a height sufficient to balance the maximum steam pressure is connected by means of a pipe with the first. For instance, with a steam pressure of say 150 lb. gage, the distance between the mercury levels in the two legs of the "U" tube would be 305.5 in., or about 25.5 ft. In the upper reservoir there is a float which rises and falls in direct proportion to changes in steam pressure. When this float raises, due to an increase in steam pressure, it lifts, by means of a yoke and connecting cable, the spindle of a four-way valve, admitting oil or water pressure on a top of a plunger and releasing the pressure below. This plunger and the float are connected by a cable which passes under a pulley mounted on the control valve spindle, the movement of which is therefore controlled differentially by that of the plunger and the float. As the plunger descends it lowers the spindle of the control valve and cuts off the hydraulic pressure unless there is a continued rise of the float due to continued increase in steam pressure. Thus the movement of the plunger is gradual and its position is proportional to the boiler pressure at all times. The movement of this master control plunger is communicated to chronometer valves on the blower engine or turbine and on the stoker engine. These valves control the amount of steam supplied to these engines and hence the amount of air delivered to the furnace and the stoker speed.

Damper position is controlled by variations in the over-fire draft. This draft is communicated to the space under the bell of an oil-sealed gasometer, which is held in equilibrium by a counter weight. Any variation in over-fire draft will vary the position of the bell, and this movement is used to actuate a four-way valve controlling a hydraulic plunger, as in the case of the steam pressure control. The plunger movement is used direct to control the damper position.

Thus it will be seen that a reduction in steam pressure caused by an increase in demand will cause the steam pressure control to increase the under-fire pressure and to speed up the stoker. The resulting increase in pressure over the fire will act through the gasometer to open the damper.

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Machinery for Ground Wood and Chemical Pulp

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The Paper Industry Safety Contest

July 1, 1933 to June 30, 1934
Scores as of June 30, 1934
Twelve Months Cumulative Scores
6 Mills Establish Perfect Record

PERFECT SCORES
Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A			
GROUP B	St. Croix Paper Co.	Woodland	Maine
GROUP C			
GROUP D	Bird & Son, Inc.	Roofing Plant	Chicago, Ill.
	International Paper Co.	Riley	Maine
	Hollingsworth & Whitney Co.	Abenaquis	Madison, Me.

Division II—Remanufacturing

Container Corp. of America	Natick	Massachusetts
Southern Container Co.	Houston	Texas

IMPERFECT SCORES

	Key	Rank	Points Credit	Points Debit
GROUP A	PA- 6	1	827.760	
	PA-17	2	793.024	
	PA-11	3	742.448	
	PA- 1	4	670.542	
	PA- 2	5	666.262	
	PA- 8	6	599.912	
	PB- 5	7	594.304	
	PA- 4	8	508.872	
	PA- 5	9	503.440	
	PA- 3	10	400.136	
	PA-14	11	295.360	
	PB- 2	12	282.880	
	PA-13	13		141.806
	PA-12	14		168.102
	PA-15	15		383.056
	PA- 7	16		716.984
	PA- 9	17		1,119.928
GROUP B	PB- 9	2	917.512	
	PC-10	3	813.418	
	PB- 1	4	781.080	
	PB-15	5	675.854	
	PB- 7	6	656.352	
	PB- 3	7	602.974	
	PC- 9	8	582.488	
	PC- 7	9	546.882	
	PB-16	10	372.560	
	PB-11	11	318.534	
	PB- 6	12	249.048	
	PB-14	13	185.832	
	PB-13	14		84.266
	PB- 4	15		199.386
	PC-19	16		1,121.050

DIVISION II

	RB-1	3	846.010	
	RD-4	4	838.768	
	RC-1	5	774.602	
	RD-1	6	740.902	
	RC-5	7	694.560	
	RD-5	8	671.274	
	RC-2	9	376.746	
	RD-6	10	184.342	
	RC-4	11	43.594	
	RC-3	12		270.946
	RD-3	13		631.440
	RD-7	14		848.142

	Key	Rank	Points Credit	Points Debit
GROUP C	PC- 6	1	936.730	
	PC-22	2	800.008	
	PD-28	3	700.418	
	PC-14	4	679.602	
	PC-25	5	565.162	
	PC-11	6	540.120	
	PB-10	7	528.282	
	PB-17	8	495.392	
	PD-25	9	471.842	
	PC-15	10	427.290	
	PC-24	11	368.494	
	PC-18	12	313.654	
	PC- 8	13	276.796	
	PD- 8	14	271.726	
	PC-20	15	258.960	
	PC-23	16	171.338	
	PD-14	17	165.226	
	PC-21	18		1.878
	PC-12	19		122.528
	PC-13	20		181.712
	PC-16	21		203.030
	PC- 3	22		341.250
	PC- 4	23		732.942
	PB-18	24		814.402
	PC-26	25		734.602
GROUP D	PD- 1	4	802.096	
	PD-27	5	785.186	
	PD- 6	6	739.402	
	PD- 9	7	667.386	
	PD-26	8	659.856	
	PD- 4	9	636.592	
	PD-17	10	631.432	
	PD-15	11	556.902	
	PD- 5	12	508.106	
	PD-18	13	430.186	
	PD- 3	14	351.176	
	PD- 8	15	70.046	
	PD-24	16		27.544
	PD- 7	17		131.866
	PD-20	18		237.050
	PD-12	19		545.624
	PD-29	20		624.336
	PD-11	21		664.806
	PD- 2	22		933.768

No June Report: PA-16; PC-2.
Withdrawn: PA-10; PB-8, PB-12; PC-5, PC-17, PC-27; PD-21, PD-22; PD-23; RA-1.

◆ **THE SCORES published on this page complete The Paper Industry Safety Contest which closed June 30, 1934. The National Safety Council, sponsor of the contest, announces these scores as tentative and they must not be construed as announcing the group winners nor as being final. All records will be carefully checked by the Council before the final report is published. Winners will not be announced until the Annual Safety Congress in Cleveland, Ohio, October 1 to 5.**

Watch Your Felts!

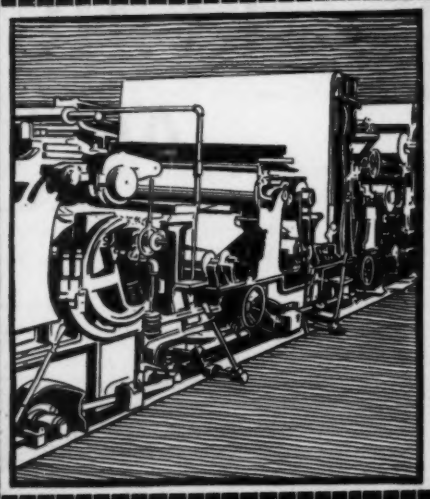
Five years ago a few thousand dollars more or less for felts in a year's time made little difference. Today, with every mill struggling with conversion costs, even dimes count.

That is why it is so necessary that felt problems receive careful study—why the care of felts looms important—why the expenditure of more for felts than skillful operation requires, becomes almost a tragedy.

Place your felt expenditure on a par in importance with what you pay for coal and steam and the other things you buy. It is no less vital.

Go over your felt problem with an Orr representative. Adopt Orr Felts as your first step towards felting economy.

The Orr Felt and Blanket Company
Piqua, Ohio.



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The Unseen Man

—yet present while they plan their advertising campaign!

o A lot of consideration is given to the work of the advertising man, the artist, the engraver and the printer. How often is thought given to the merchant who supplies the paper? Yet without him and the service he renders it would be impossibly difficult to produce successful campaigns that include any direct advertising, or even any sales letters.

o Few men can make the claim that their industry contributes to every other business in the community. The printer can say this: So can the paper merchant. It would pay them to say it more often and say it together. For each of them can help the other. And the paper mill can help both of them to achieve a broader recognition of the value of their work.

o Hammermill is proud to be associated with the merchants who are agents for Hammermill lines and through them to serve the printing industry in greater measure than is the privilege of any paper mill in the world.

o Hammermill advertising, whether in a national magazine or a sample book, aims to cooperate with the printer and the paper merchant and to give full credit to the service they render.

HAMMERMILL PAPER COMPANY, Erie, Penna.

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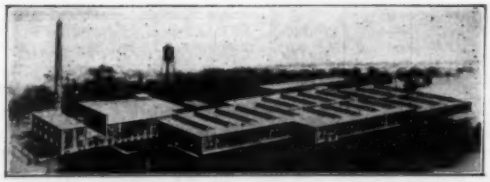
KENWOOD MILLS

ALBANY, N.Y.

KENWOOD WOOL PRODUCTS REG. U.S. PAT. OFF.

Manufacturers of Kenwood Felts and Jackets for all Pulp and Paper Making Purposes since 1870



KENWOOD MILLS LTD. ARNPRIOR ONTARIO, CAN.

◆ Farrel-Birmingham Sales Conference

During the week of June 25, the sales force of the Farrel-Birmingham Co., Inc., met at the company's offices at Ansonia, Conn., for the annual sales conference.

The meeting opened on Monday, the 25th, with an address by the President, N. W. Pickering, in which he reviewed the business of the past year, the prospects for the ensuing year and discussed the NRA codes and their effect on sales.

The following sessions were devoted to discussions of the various products manufactured by the company, with particular relation to the sales problems involved; the latest developments were explained by the sales and engineering department heads, and an opportunity was afforded on Wednesday for an inspection of the machinery then being built in the shops. There were golf tournaments and a dinner meeting which was attended by a large number of the company's organization.

◆ Voith Gets Contract for Turkish Mill Machinery

Announcement is made by the Bureau of Foreign and Domestic Commerce that the contract for machinery and engineering for the new Turkish groundwood and paper mill at Izmit has been placed with the German firm "Voith", according to a recent report from Commercial Attache Julian E. Gillespie, Istambul. It is understood that the mill will consist of a groundwood unit with a capacity of 15 tons per day of 24 hours, and a paper unit with a capacity of 35 tons of paper and cardboard. The contemplated output of the paper mill is distributed as follows: Cardboard 2,000 tons (per year); wrapping paper 4,000 tons; fine writings 2,700 tons; medium fine writings 1,800 tons; blotting paper 40 tons. It is expected that the Ministry of Finance will purchase practically all of the fine writing paper and about 1,200 tons of medium fine quality for the various government departments, bureaus, and institutions. The Tobacco Monopoly will consume approximately 1,300 tons of board and a similar amount of wrapping paper.

◆ New Officers of Society of Chemical Industry

The American Section of the Society of Chemical Industry announces the election of the following officers to serve for the year ending June 1, 1935: Chairman, Robert J. Moore; vice chairman, W. D. Turner; hon. secretary, Foster D. Snell, hon. treasurer, J. W. H. Randall.

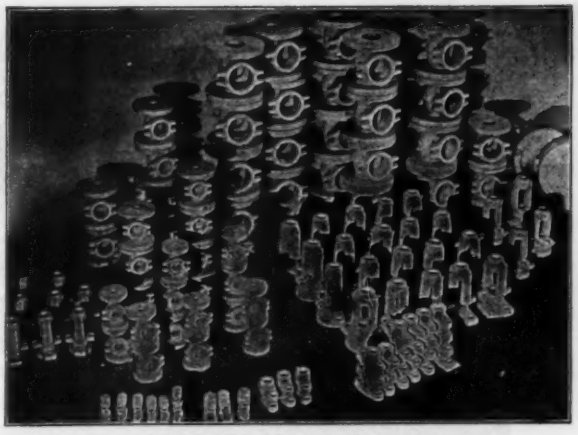
In addition, five new members were elected to the Executive Committee to take the place of retiring members. Those newly elected are: Lincoln T. Work, Wallace P. Cohoe, Albert E. Marshall, James G. Vail, and Charles A. Lunn.

Timber Preservation Laboratory Completed

Through the contribution of labor by the Temporary Emergency Relief, it has been possible for the New York State College of Forestry to move its timber-treating laboratory into new quarters and make improvements in the plant. The laboratory is now housed in the building formerly used as the heating plant which gives more room for the assembly and efficient handling of apparatus. The equipment and layout compare favorably with the best experimental plants of this type. The plant is in charge of J. O. Blew of the Department of Forest Utilization.

The equipment in the new laboratory has been designed and assembled to make possible the application of any of the pressure processes for impregnating timbers with preservatives. Two complete pressure cylinders, each equipped with working tanks, heating coils, pressure, vacuum and steaming facilities, offer wide opportunities for class instruction and research. The cylinder for treating is nine feet in length so that timbers such as cross ties and fence posts may be accommodated. This cylinder is equipped with indicating and recording pressure vacuum and temperature instruments and has a maximum pressure capacity of three hundred pounds per square inch.

A small four-foot cylinder is mounted on scales, making possible the accurate weighing of its contents at any time during the timber-treating process. The smaller cylinder, due to its low capacity, makes possible the use of a wider variety of treating solutions or preservatives than could be used economically in the larger equipment.



Durimet Valve Parts in the rough

BEATING DOWN MAINTENANCE COSTS

The long life of Durco Alloy Steels in contact with sulphite liquors is an important factor in reducing maintenance costs in sulphite mills. Durco Alloy Steels are especially economical for use in a variety of forms such as pumps, Y-valves, blow off valves, relief valves, digester fittings, strainers and similar equipment.

Gate and globe valves are procurable in *low carbon* (below .07%) Durimet, Durco Alloy Steels or in any special analysis not covered by patent.

Gate valves carried in stock include sizes 1″ and 1½″ with combination screwed-split flanged ends; 2″ valves with screwed ends or with integral flanges; 3″ and 4″ with integral flanges only.

In addition to the standard equipment, special equipment of comparatively intricate design are practicable and can be made in Durco Alloy Steel of any special analysis desired.

Durco Alloy Steels may be the solution to your particular corrosion problem. Certainly, accepting the corrosion of equipment by hot sulphite liquors as inevitable isn't the only thing to do. Why not write today and let us tell you what we can do for you.

The DURIRON COMPANY, Inc.
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DURIRON

GOOD VALVES

SINCE 1846

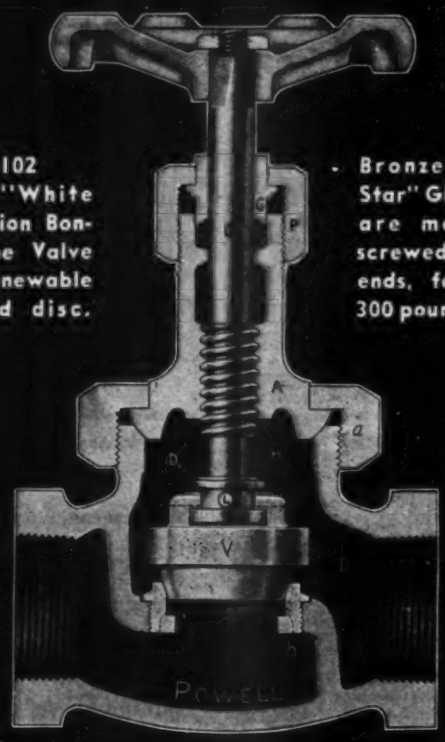


Fig. 102
Bronze "White Star" Union Bonnet Globe Valve with renewable seat and disc.

Bronze "White Star" Globe Valves are made with screwed or flanged ends, for 200 or 300 pounds W. S. P.

If Powell Valves were not a quality product, The Wm. Powell Company could not have lasted so far toward the century mark.

Only a company which gives satisfaction to customers can weather the storms of so long a period as eighty-eight years.

For many years the Powell "White Star" has been the guide to high quality. The years to come will see no dimming of its prestige. Consequently there always will be a demand for the *many-purpose* "White Star" valves that are so practical because of the renewable seat and disc feature.

The Wm. Powell Co. • 2525 Spring Grove Avenue • Cincinnati, Ohio

POWELL VALVES

TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

IN THE PAPER INDUSTRY ■ DOMESTIC AND FOREIGN

◆ Impregnation of Paper With Viscose

Two difficulties hitherto encountered in impregnations of this type are incomplete penetration and fragility of the wet sheet prior to the actual coagulation of the viscose. That these difficulties have been successfully surmounted is the claim of the present invention. In Fig. 1, the paper sheet (1) unwound from the roll (2) passes over a drum (3) supplied with viscose sol by making contact with the cylinder (4), which is partially immersed in the viscose bath (5). Thus one surface of the sheet is coated, while the excess of solution is immediately removed by the scraper (6), which also serves to smooth out the impregnated surface. This first application causes a partial penetration of the sol into

Fig.1.

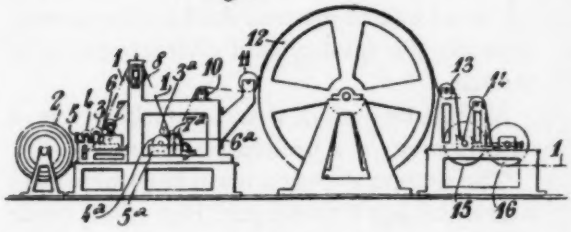


Fig.2.

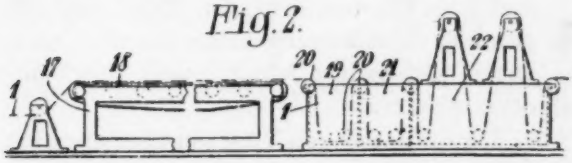
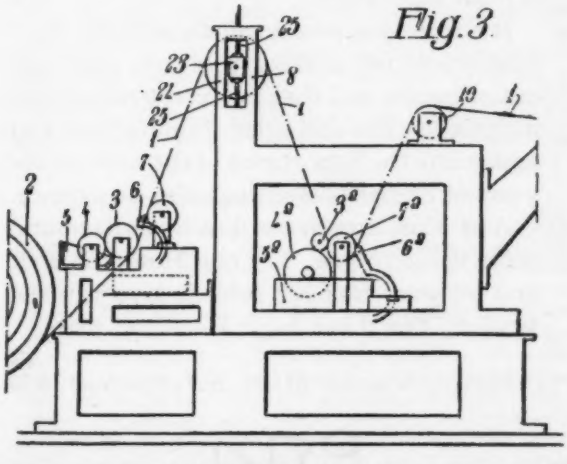


Fig.3.



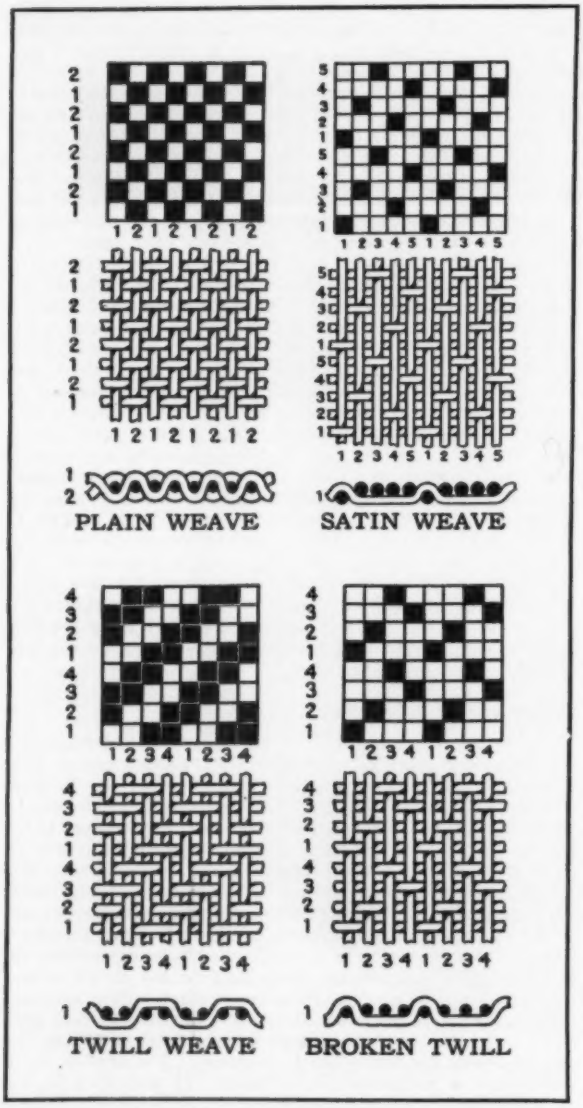
the paper by means of capillarity during the passage of the sheet over the roll (7). Another roll (8) leading to a second device for applying viscose to the other surface of the sheet is adjustable, so that its distance between (7) and the viscose-coating roll (3^a) can be changed at will. (3^a) contacts the cylinder (4^a), which is also partly immersed in a viscose bath. When the two surfaces of the moving sheet are thus coated, impregnation takes place naturally as sheet (1) passes over rolls (10) and (11), drum (12), and cylinders (13) and (14). Two press rolls (15) and (16) remove the excess of solution from (1), and cause further impregnation. The position of (16) may be mechanically regulated so as to vary this pressure. Depending on the thickness of the paper two different methods may then be followed, of which only one (the most satisfactory) is described in this abstract. Sheet (1) after leaving (16) passes over an endless belt or felt (18), supported by the table (17) shown in Fig. 2 which is made up of separate units, so that its length can be extended or shortened, depending on the time required for penetration, which should be complete, when the end of the table is reached. The sheet is then led into the first coagulating bath (19), supplied with guide roll (20), thence into a second bath (21), and finally into a rinsing bath (22), where it is essential that the sheet emerges from the tanks, so that the coagulation may be visually inspected, and also to extend the washing period. Under certain conditions (20) may be eliminated. The extremely low tensile strength of (1) even when it leaves (3) makes it quite impossible to use the friction of the sheet in any way to cause the revolution of impregnating rolls, the drum, or the various guide rolls. In other words to eliminate all strain on the paper, these rolls, from (3) on must be joined kinematically by suitable mechanical means, so as to reach a uniform linear speed. Similarly (18) and the various guide rolls in Fig. 2, must be mechanically synchronized with the moving parts in Fig. 1. The rolls are all supported by bearings that may be mutually adjusted. The machine thus avoids all breaks in the wet sheet. Fig. 3 shows in greater detail, and on a larger scale, a part of the viscose impregnating equipment. Other variants of the above scheme (with illustrations) are described by the inventor. Bernard H. Cottereau. French Patent No. 762,713.

◆ Degree of Pulping

The second recent report of the Faserstoff-Analysenkommission des Vereins der Zellstoff- und Papierchemiker und -Ingenieure. (The fiber analysis committee of the Society of Pulp and Paper Chemists and Engineers of Germany). This deals with an adaptation of Johnsen and Parsons' original method for determining the permanganate number of sulphite and soda pulps. [Cf. Zellstoff u Papier, 2, 258 (1922)]. Using a standardized disintegrator, manufactured by Zellstoff-fabrik Waldhof, Werk Mannheim, bone dry or air-dried pulp is disintegrated in the following manner: 5 grams of bone-dry (or a correspondingly larger amount of air-dried) pulp are treated with 159.5 to 160 cc. of water, depending on the original moisture content. Pulp containing more than 10 per cent water must have a different pretreatment. The water should be introduced at 40-50 deg. C., and thorough disintegration is essential. The stuff is then transferred quantitatively to a beaker, by means of 40 cc. of water, whereupon the beaker is kept covered, at 25 deg. in a suitable bath, so that uniform swelling is insured. Then, 50 cc. of 0.1 Normal potassium permanganate solution (at 20 deg. C.) are run into the mixture, which is then allowed to remain for exactly one hour at 25 deg. C., and stirred from time to time with a glass rod. The pulp is then filtered off by suction, and 10 cubic centimeters of the filtrate are transferred to an Erlenmeyer flask, together with 20 cc. of 0.1 Normal oxalic acid, and 50 cc. of water acidified with sulphuric acid. By means of a back titration of the excess of oxalic acid (by the use of standardized permanganate solution), the original permanganate consumption (due to residual lignin, etc.) may be computed. This figure multiplied by 5, gives the permanganate figure in terms of one gram of dry pulp. When wet pulp is used the preliminary treatment is modified, and the pulp is centrifuged under standard

What weave

shall it be?



THAT'S a simple question. But it's a hard one to answer. And on the answer depends the quality and characteristics of the felt.

Shall it be a plain weave, a twill weave, a satin weave, or a broken twill weave?

The answer depends upon the purpose to which the felt is to be put. But you'll never find it in the textile books. They may tell you how to make each weave but what each weave will do in a felt . . . well, that's another matter.

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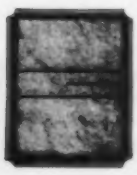

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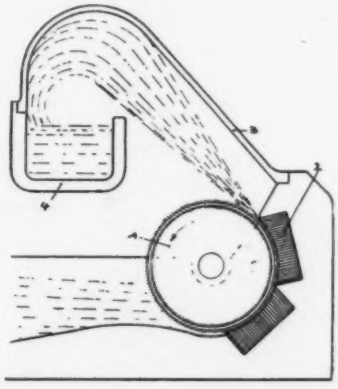
Hamilton Felts

76 YEARS OF EXPERIENCE MAKE A WORLD OF DIFFERENCE

conditions until it reaches a moisture content of 68 per cent. (This figure may vary and should be accurately determined.) A sample of 15.6 grams then represents 5 grams of bone dry material, and this is wet down with 189.4 cc. of water. Subsequent operations are very similar to those already described. The relationship between these values for hardness in various sulphite pulps (and so-called apparent hardness in soda pulps) and the Roe, Johnsen, Roschier, Sieber, Björkman, Enso, and Johnsen-Noll numbers are given in a compact table (arranged by Noll, Papier-Fabr., 31,585) together with the percentage of lignin, and chlorine consumption. This furnishes a hardness scale for unbleached pulps. For example, degrees of hardness of 1, 2, or 3 would characterize a very soft pulp; degrees of hardness ranging from 20 through 24 would represent a very hard pulp. Between these extremes there are 7 gradations listed on the scale. Anonymous. Papier-Fabr. 32, No. 14, 157-9 (1934).

◆ Beater

The invention depends on making the best possible use of kinetic energy in improved beater construction, so that the stock may be projected upwards with a view towards obtaining high pulp consistency and high stock content in a beater provided with a roll of relatively small diameter. A bedplate (2), placed at the side of, and ending at the upper half of the beater roll (1), is connected with a curved



hood (3). The latter takes the general shape of the outer trajectory of the stock as it is flung from (1), and is connected with a return-flow gutter (4) that leads the stuff back to the beater and which is placed well above the top of roll (1). Thus the stuff takes a free course, reaches its maximum height, and is returned to the beater tub without loss. Dipl.-Ing. Helmuth Banning. Düren. German Patent No. 520,347; Kl. 55c.

◆ Tests for Casein and Animal Size

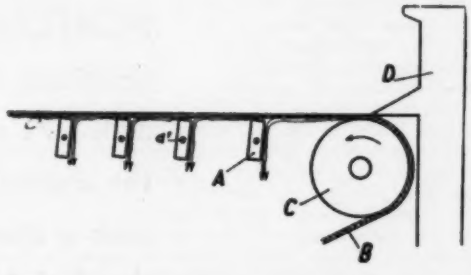
The authors point out the difficulty in distinguishing between glue and casein papers by the use of color reactions, most of which are not very sensitive, or which are readily obscured by other colors. The following technique is suggested: Five grams of the finely divided paper are treated with about 40 cc. of cold 0.5 per cent acetic acid for 24 hours. To all practical purposes this treatment dissolves only animal size in the paper. With some alkaline, coated papers, however, 1 per cent acid must be used. In any event the extract should always be definitely acid. After filtration, and subsequent leaching of the paper residue, the latter is extracted with a cold 1 per cent borax solution for 24 hours. This solution dissolves the casein, and these two relatively mild treatments usually insure protein removal with the extraction of the minimum amounts of other substances. The filtered extracts are often more or less colored, but this coloration does not seem to depend on the mechanical pulp originally present in the paper. If starch is present, this should be precipitated by the usual method; i. e., with iodine in potassium iodide solution, together with the addition of ammonium chloride. (The exact technique is not given.) Of all the differential reactions, that of Schmidt (Chem. Ztg. 34, 839 [1910]) seems the most trustworthy. Here ammonium molybdate is used in conjunction with nitric acid. The former precipitates both casein and glue from its solutions, but when nitric acid is present, only casein is precipitated. The separate extracts may be tested with suitable portions of a reagent consisting of 5 grams of ammonium molybdate in 100 cc. of cold water, which is then poured into 35 cc. of nitric acid, of density 1.2. When the extractives are very low in protein, the mixtures should be warmed. Specific color reactions (etc.) for animal size are still unsatisfactory. The Adamkiewicz test (depending on the fact that tryptophan derived from casein gives a violet color with glacial acetic acid and sulphuric acid) while specific for casein, cannot well be applied to solutions the concentrations of which are much under 0.2 per cent. The authors critically discuss various methods for differentiation, and frankly admit that when the paper contains only small amounts of casein or glue, even their modifications give rise to difficulties. B. Schulze and E. Rieger: Papier-Fabr. 32, No. 26, 245-6 (1934).

◆ Pulp for Highly Absorptive Paper

Papers of very high absorptive capacity, and parchment papers as well, may be made by treating rags, soda pulps, or similar fibers with 5 to 15 per cent caustic soda solution, of which the excess is then squeezed out, and the resulting mixture allowed to stand at ordinary temperature, with access to air, for several days. Thereupon the fibrous material is cooked in a spherical digester with dilute alkali. As an example:—100 kilos of stiff rags were immersed completely in 10 per cent caustic soda, and then pressed until the ratio of fiber to caustic soda solution was about 1 to 3. The moist material was allowed to stand in air for 2 to 5 days, after which the greater part of the alkali was leached out, and the final digestion made in the presence of 2 per cent caustic. The finished product was a paper of unusually high absorptive capacity. I. G. Farbenindustrie Akt.-Ges., in Frankfort-am-Main. German Patent No. 592,741, Kl. 55f.

◆ Drainage Control on the Fourdrinier

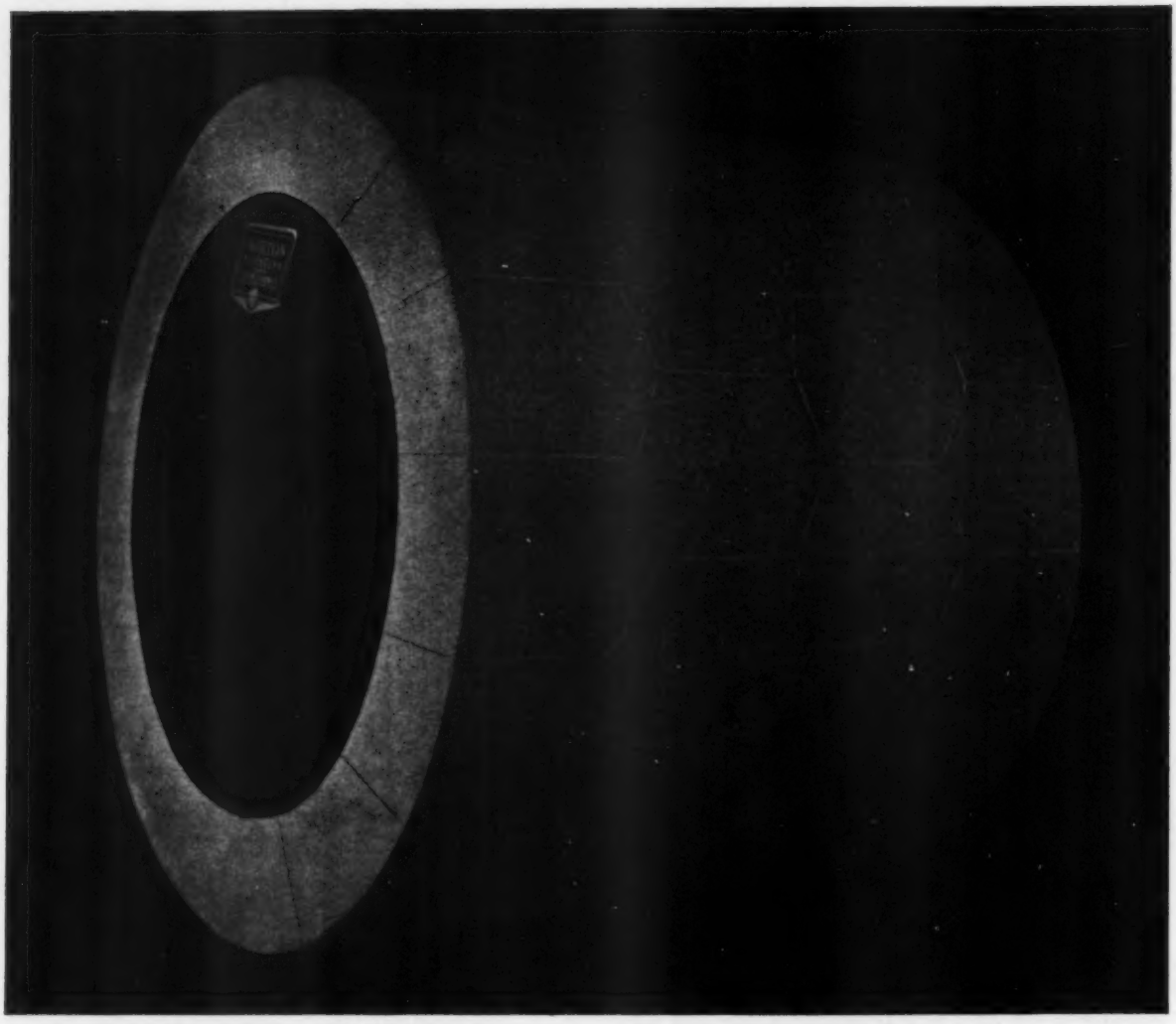
The object is to control to any desired degree, the intermediate stages of drainage on the wet end of the Fourdrinier machine, by turning suitably placed ledges (A), which are rectangular or trapezoid in cross-section, and which may have bevelled or sharp edges. They are shown in the figure, which illustrates the wet end of the machine, with wire (B) coming over the breast roll (C) with stuff from the slice (D). The ledges (A) which may be made of elastic material, are so held by journals that their positions with respect to (B) may be changed at will; i. e., the angle between the ledge and the wire can be varied to any degree. These angles may be



changed uniformly, or the ledges may slope some in one direction, some in another. These changes may be so regulated that, when the ledges are sloped sufficiently, counter to the flow of stuff, drainage may be controlled and even practically prevented. This gives the paper maker much greater control over the wet-end of the machine, especially when he is using the same machine in the manufacture of a variety of papers. J. M. Voith, Heidenheim, Brenz. German Patent No. 591,715; Kl. 55d.

◆ Japanese Pulpwoods

These are the second and third of a series of papers on chemical investigations of Karafuto woods. Digestions of



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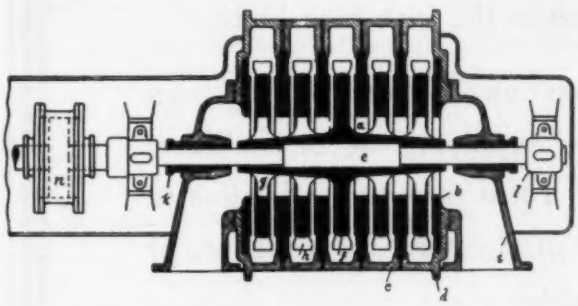
the so-called Ezo-wood, with magnesium or ammonium bisulphite, yielded pulp with a satisfactory alpha-cellulose content. Despite the fact that these figures are higher than those of certain commercial pulps, the latter actually gave better rayons. This is another piece of evidence that analytical figures alone do not give a true picture of the suitability of a given pulp in viscose manufacture. Three other Karafuto woods were chemically studied and completely analyzed: a poplar, Populus Suaveolens Fish, known in Japan as Doroyanagi, and two willows, Salix Opaca Anders, (Onoheyanagi) and Salix Caprea L. (goat willow) also known as Bakkoyanagi. The percentages (in sets of 3) that follow, refer respectively to these woods in the order in which they are listed above: total cellulose, 56.86; 55.71; 54.35; alpha cellulose, 33.82; 35.71; 37.27; lignin, 22.47; 19.19; 21.22; pentosans, 17.41; 19.91; 14.03. The authors also determined ash, alcohol-benzol extractives, hot and cold water, and 1 per cent NaOH soluble matter, mannans, galactans, nitrogen, beta-and gamma-cellulose (combined), and the methoxyl contents. The woods are suitable for paper manufacture. Masuzo Shikata and Shokoku Ba; Cellulose Industry (Japan) 9, 37-9 (1933); through Papier-Fabr. 32, No. 17, 201, No. 20, 235-6, (1934).

◆ Various Sizing Agents

Although ordinarily tallow, soy bean oil and lard are inferior to rosin as sizing agents, paper sheets sized with these ingredients and which are then dried at higher temperatures, actually show better sizing qualities than those obtained with rosin. Mitsunori Higaki; Cellulose Industry (Japan), 9, 36 (1933); through Papier-Fabr. 32, No. 20, 237 (1934).

◆ Pulp Refiner

The figure shows a rotary mill to which the stuff is fed axially on the sides, and which is then discharged radially. The fixed, bilateral grinding discs (a) and unilateral discs (b) are suitably arranged in a spiral housing, provided with supporting partitions (d). Within this casing rotates the shaft (e) to which are attached a series of grinders (f). The spokes of these (g), with the one exception of the central grinder, are sloping, and form the arms of an axial pump. The rotating grinders (f) also contain outer scoops or paddles (h). The working surfaces of both the stationary and



the movable grinders are provided with blades, in scissors-like arrangement. A stuffing box (k) serves to make tight the shaft (e), which is supported on the bearing (l). The invention consists in the fact that (e) moves eccentrically with respect to the casing. This permits the continuous shift or oscillation, hither and thither, of the rotating grinders with respect to the fixed grinding surfaces. The number of oscillations of the shaft may vary from the number of its revolutions. As an example: The axial movements of (e) may be controlled by a cylinder (n) by means of changing hydraulic or oil pressure acting upon a piston. Werner Reisten, Aschaffenburg. German Patent No. 596,155; Kl. 55c.

◆ Worldwide Advances in Pulp and Paper Testing

A bibliographic contribution from the German Bureau for testing materials in Berlin-Dahlem, giving also an excellent, concise outline of the work done in 1933, on durability, microscopic examination and chemical and physical testing of paper, and of the advances made in the chemical and physical testing of pulp. Although the German references predominate, work done in the U. S. A., England, France, Finland, Norway, Sweden, and Holland is also cited. The list includes 75 publications. Prof. Dr.-Ing. Korn., Papier-Fabr. 32, No. 16, 181-186 (1934).

◆ Stuffing-Box Device

Where the shaft emerges from the casing, the stuffing box depicted in Figure 1, provides for a gas-tight joint in the following manner: a rubber ring (A) bears on the collar (B) of the shaft. A spring presses on (A), and any unlooked for leak is obviated by the flexible bellows (D). A feature of the invention is shown in Figure 2. It comprises of lay-

Fig 1.

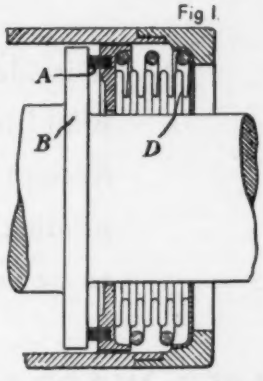
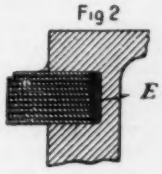


Fig 2



ers of a spirally wound strip of phosphor-bronze alternating with a lubricant, like a tape impregnated with graphite. This is pressed out to its work by the rubber band (E). Packless Gland Co., Ltd., Middlesex, and W. F. F. Martin-Hurst, London. British Patent No. 395,969; through British Paper-Maker and British Paper Trade J. 87, No. 4 (Technical Supplement) 96 (1934).

◆ Degree of Acidity in Paper

Concepts regarding acidity have changed greatly during the past years. If the symbol, pH in paper according to present day usuage is defined, then the pH of the paper should be considered identical with the pH of an aqueous extract of that paper, in which however, the fiber concentration, the time of extraction, and the temperature are chosen arbitrarily. A study of the control methods for determining pH arouse the suspicion that the technique now used does not furnish a clean-cut index of the intensity of acidity, when papers are extracted by the usual methods. The author arrives at the following conclusions:—(1) the pH of different papers may be satisfactorily compared following cold water extraction; (2) warming the aqueous suspension causes the formation of H-ions not originally present in the paper, and does not increase the rate at which equilibrium is established between the solid and liquid phases; (3) this equilibrium is very rapidly established by using cold water; (4) the distribution of H-ions between the fiber and the liquid is also dependent on other positive ions; (5) this furnishes a clue to the fact that paper may not show a constant intensity of acidity, even though the pH of the back water may be constant. If the H-ions are to be removed quantitatively from paper, they must be exchanged for other positive ions. The absolute acidity of a paper cannot be measured as the result of a single extraction with either distilled water or with a neutral aqueous KCl solution. For practical purposes however, a highly concentrated salt solution may be used in the extraction. From these findings (and others not herein listed) the author concludes that there is really little to be gained in determining the pH in a finished paper, over the old fashioned alkalimetric titration for total acidity. If such a titration is to be carried out, he recommends the three successive, gradual extractions recommended by Köhler and Hall (reference not given) for determining the degree of acidity, with the exception of the use of heat, as suggested by these authors. K. Haug. Papir-J. 21, 184 (1933); through Papier-Fabr. 32, No. 11, 126-7 (1934).

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The COMMERCIAL OUTLOOK

New York, August 1, 1934.

THE "dog days" of midsummer are witnessing little development of much importance in the paper market. This season, ordinarily the quietest period of the year for the paper industry, is running true to form. There is, of course, business being consummated day by day and it is running into fair volume, from an aggregate standpoint, but it is mainly routine and has scant influence on the general market situation. Buyers are cautious, and manufacturers and jobbers are finding it next to impossible to persuade consuming customers to absorb other than actually needed supplies, such as has marked purchasing operations for some weeks past. And yet, judging from most reports and from the industry's statistics that are available, paper production, sales and consumption are on a comparatively satisfactory scale.

It is very evident that a decided degree of hesitancy marks operations of buyers in the market at present. This is not a condition confined to the paper trade but is apparent in nearly all industries. An air of uncertainty seems to exist in trade circles—all down the line, from the biggest manufacturing organizations to the small country retailers scattered throughout the land. There appears to be more of a desire to liquidate stocks than to pile up goods on shelves. Just what is chiefly to blame for this condition is difficult to say. Seemingly, it is a combination of factors, some recently developed. The foreign political situation is one; the severe droughts in the West are another; the West Coast strike, which fortunately has just ended, has been another, the common perplexity regarding general business this fall and in the closing months of the year—all these are waging a checking influence on business, and in addition there is the usual summer quietness and the uncertainty which is felt in many quarters regarding the NRA set-up.

However, within the limits of the paper industry itself there is a pronounced note of optimism existing. Paper manufacturers, mill agents and jobbers, with few exceptions, express confidence concerning the outlook. Everything considered, the industry is faring relatively well during the dull summer period. Few paper mills are rushed with orders but a large majority are managing to keep passably busy. Many have contracts which are necessitating manufacturing operations on a fair scale, and current business is arising in a consistent manner and in comparatively good volume. True enough, most paper mills have curtailed production during the summer but this was to be expected and a situation almost invariably encountered at this season.

Opinion in the trade is that business in paper of various kinds will register a distinct upturn in the early autumn. The belief is that stocks in the hands of consumers and converters have been well depleted, and that as requirements increase, as they usually do after the hot weather months, buyers will be obliged to come into the market for appreciably larger supplies. The deterrent influences which have affected business recently will be dissipated, it is believed, and expectations are general business will forge ahead at a fairly rapid pace and that the paper industry will share to its full measure in the improvement.

Production of newsprint by Canadian mills in June was the largest in that month in recent years, topping even the 1929 and 1930 high points. A total of 229,637 tons were manufactured, compared with 171,419 tons in the similar month last year, an increase of 58,218 tons or 33.9 per cent. In June, 1929, production was only 225,055 tons. Mills in the United States produced less newsprint than in June a year ago, the output in this country amounting to 83,504 tons, against 84,384 tons in the same month last year, a decrease of 880 tons or 1 per cent. Production in May of this year was 242,539 tons in Canada, and 89,726 tons in the United States.

In only two years in the history of the Canadian newsprint industry did production for the first six months of a year exceed that of the first six months this year. The output in Canada during the first half of the year totaled 1,260,633 tons, contrasted with 894,487 tons in the same period last year, an increase of 366,146 tons or 30.2 per cent. In the first half of 1930 the output of these mills was 1,284,158 tons, and in the similar time of 1929 a total of 1,311,322 tons was produced. The output in the United States in the first six months of the current year exceeded that of 1933, but failed to top any other recent year. A total of 498,485 tons was produced, comparing with 456,502 tons in the first half of 1933, an increase of 41,983 tons or 9.2 per cent. For both countries, newsprint production in the first six months totaled 1,759,118 tons, against 1,350,989 tons last year, a gain of 408,129 tons or 30.2 per cent. This exceeded the output for both countries during the first halves of 1932 and 1931, but fell below the production of 1,970,449 tons in the same period of 1930.

Shipments of newsprint from mills in June amounted to 79,721 tons in the United States and 225,449 tons in Canada, compared with 90,951 tons and 236,969 tons, respectively, in the preceding month, and 87,359 tons and 171,678 tons in June, 1933.

Mills in the United States produced a total of 223,478 tons of paperboard in May last, compared with 244,334 tons in the preceding month and 287,032 tons in May, 1933, and bringing the aggregate for the first five months of this year up to 1,176,308 tons, against 1,159,610 tons in the corresponding period last year, according to the monthly summary of the U. S. Department of Commerce. The May output was at 55.4 per cent of mills' rated capacity, against 66.1 per cent in the month before, and 68.7 per cent in the similar month a year ago. New orders received for board in May called for 225,957 tons, contrasted with 230,754 tons in the preceding month, and unfilled orders held at the end of May were for 80,958 tons, against 76,578 tons a month before. Shipments of board from mills during May totaled 197,543 tons, compared with 213,956 tons in the preceding month, and stocks on hand at mills at the end of May were 83,873 tons, against 82,190 tons a month earlier. The production of board during the first five months of the current year was at 61 per cent of mills' rated capacity, a better showing than in the same period of 1933 when the output was at 58.6 per cent of capacity.

◆ ◆

◆ Houghton & Co. Elect New Officers

At a special meeting of the stockholders of E. F. Houghton & Company, oil and leather manufacturers, held on July 20, the office of chairman of the board was created and Louis E. Murphy, formerly president, was elected to that position.

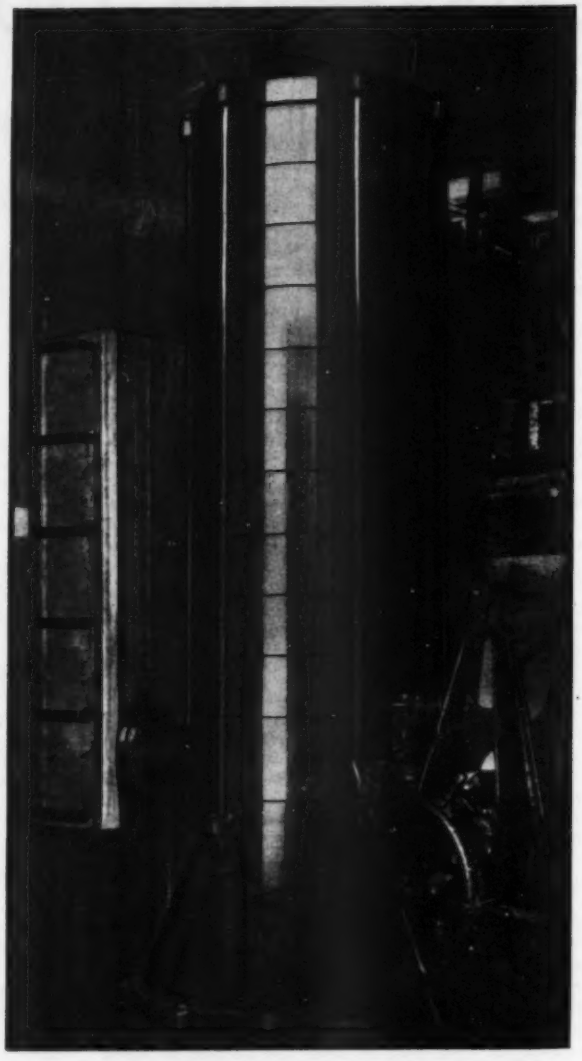
Mr. Murphy has been with the company forty-four years; he was secretary from the time of its incorporation until elected vice-president in 1914, and continued in the latter office until he was elected president in 1929 following the death of Charles E. Carpenter.

Major Aaron E. Carpenter was elected president and general manager. He has been with the company twenty-nine years, was a member of the original board, and served as treasurer from 1921 to 1929, when he became first vice-president. Major Carpenter represents the third generation of Carpenters to occupy the presidency of E. F. Houghton & Co.

Other officers elected were: George W. Pressell, vice-president and director of sales; A. Everly Carpenter, III, secretary; Dr. R. H. Patch, treasurer; C. P. Stocke, assistant secretary; Miss M. M. Menningen, assistant treasurer.

The stockholders also voted to increase the board of directors to seven members, the following being elected: Louis E. Murphy, Major Aaron E. Carpenter, George W. Pressell, A. Everly Carpenter, III, Dr. R. H. Patch, Herbert B. Fox, C. Howard Butler.

Brushing and Hydrating Sixty (60) Tons of Bleached Sulphite each 24 hours, and Using Only 85 hp. to do it in a mill in Wisconsin.



Making Better Paper the Better Way — Larger Production for each Paper Machine, by Reducing Wastes, and Cutting Costs.

June 21, 1934

"In regard to the Hydrator that we purchased from you four months ago, we have found that it is very economical on power for the amount of stock we hydrate thru it in twenty-four hours. The amount of tonnage we put thru is about sixty (60) tons per twenty-four hours.

"We find that this Hydrator does not cut our stock but is more of a brushing machine to prepare the stock before putting it thru a Jordan. Anyone wishing to see this Hydrator will have the privilege of coming up here and seeing what we do with it." ***(Name on request)***

LOVE BROTHERS, INC., AURORA, ILLINOIS

Domestic RAW MATERIALS

◆ Papermaking Rags

Midsummer is ordinarily a dull period for the papermaking rag market, and the situation in recent weeks has been truly characteristic of that usually witnessed at this time of the year. As yet, there has been no improvement, or even so much as signs of impending expansion in demand from paper manufacturers, nearly all of whom seem to be confining raw material purchases to bare routine requirements while permitting the future to take care of itself. Current business in rag stock is of slim dimensions at best. There is a little buying going on, but the tonnages involved are small, and it appears that manufacturers cannot be prevailed upon to absorb other than needed supplies.

Dealers insist there are a number of bullish factors in the market, but apparently they have scant or no influence with demand as narrow as it happens to be. Emphasis is put on the limited production and collection of rags, new and old, for some time, and dealers assert that stocks in their possession are much below normal even though it is common opinion in the trade that paper mills are carrying almost no quantities of rags in their storehouses while letting dealers "hold the bag." Incoming supplies of new cuttings have reflected the light output of clothing factories, and collections of old rags in practically all sections of the country have not begun to measure up to normal, while on top of this supply condition there have been fair-sized exports of rags from the United States, thereby further reducing available quantities in the market. Dealers say that any increase in demand of consequence would surely be followed by a strengthening of prices.

Meantime, paper manufacturers are refusing to become apprehensive over the supply position, and are taking only meager amounts of rags to satisfy current requirements. Their view apparently is that should they find they need larger quantities, the wanted supply will come out from some sources, and even should they be obliged to meet advanced prices, they will be perfectly willing to do so provided their competitors have to grant similar prices.

The sudden and fairly substantial rise in the raw cotton market has tended to stiffen prices of new cotton cuttings, although any change that has occurred has been chiefly of sentimental character. For a time, prices of new cuttings were moving downward, but the cotton advance caused a halt in the lower trend, and quotations of dealers have since held steady, with most stocks firmly held. New No. 1 white shirt cuttings are quoted at 6 to 6.25 cents per pound f. o. b. dealers' shipping points, and some in the trade are fairly insistent on the higher edge of this price range. New unbleached cuttings are reported held at 6.75 cents at shipping points, fancy shirt cuttings at 2 to 2.25 cents, blue overall cuttings at 4 to 4.25 cents, washables at 1.75 to 2 cents, light silesias at 4.25 cents, light flannelettes at 3.75 to 4 cents, and bleached canton flannels at 5.50 cents.

Dealers quote 2.75 to 3 cents a pound on No. 1 repacked old white cottons, 2 cents for No. 2 repacked whites, around 1.40 cents for twos and blues, and 1.20 cents for repacked thirds and blues. Shipments of No. 1 whites are said to be moving abroad steadily, and it is reported that some thirds and blues have been exported to Europe. Roofing rags have eased slightly in price to levels of 75-80 cents per hundred pounds f. o. b. shipping points in the East on No. 2 stock, and from one cent to 1.10 cents a pound for No. 1 roofing.

◆ Rope and Bagging

Paper manufacturers are exhibiting little desire for either old rope or scrap bagging. Occasional purchases are, of course being made, but demand is exceedingly spotty, and the market seems largely in favor of buyers. Old manila rope is nominally 2.25 cents per pound for No. 1 domestic f. o. b. shipping points, and 2 cents to a shade higher ex dock New York for No. 1 foreign, with consumers evidently procuring all the supply needed at these figures.

◆ Mechanical Pulp

Droughts in many regions of the country, and in Canada, constitute a factor which may very feasibly lead to a much stronger mechanical pulp market. Grinders are being hampered in their production operations by low water in mill streams, and it is possible that later in the year when consumption usually increases, something of a tight supply situation will develop in groundwood. It is stated that manufacturers are not by any means pressing to sell, even though demand currently is slow at best. Grinding plants in Wisconsin are said to be nearly all shut down, and in other parts of the country production is severly handicapped and producers in many instances are finding it necessary to buy pulp. Domestic groundwood is around $27 a ton f. o. b. producing mills, or in the neighborhood of $32 or $33 a ton delivered consuming points. Canadian groundwood brought down by schooners is selling on a price basis of $25 per ton ex dock American Atlantic seaboard.

◆ Chemical Pulp

Not in a long time has the chemical wood pulp market ruled quite as quiet as during the last month. Demand has been so slim that it has been near the vanishing point, insofar as has concerned current demand for additional supplies. Producers have of course continued to ship out pulp against contracts and back orders, but fresh buying has been exceedingly slow. However, the price position is well maintained, with established prices prevailing and with sellers adhering firmly to these levels. Prime bleached sulphite is 2.75 cents upwards per pound ex dock Atlantic seaboard, unbleached sulphite 2.10 to 2..20 cents for the ordinary prime qualities and 2.25 to 2.30 cents for the easy bleaching and Mitscherlich sulphites. Domestic bleached soda pulp holds to a quotable level of 2.50 cents a pound delivered paper mills, and domestic kraft pulp is quoted 1.75 to 2 cents a pound at producing plants.

◆ Chemicals

Few changes of importance are reported in quotations on papermaking chemicals and business is mainly against contracts. Bleaching powder is steady in price at 1.90 to 2.10 cents a pound, in drums, f. o. b. works. Caustic soda is quoted at 3.60 cents a pound for the solid and 4 cents for the flake product, soda ash at 1.30 cents for bag shipments of 76 per cent solid, and brimstone at $18 to $22 per long ton at mines.

◆ Pulpwood

Demand for pulpwood is fair although mainly of routine character. Prices are steady to firm, with four-foot peeled wood quoted at $13.50 per cord f. o. b. Upper New York State points, handshaved at $15, and rossed wood at $16.

◆ Old Paper

Prices of waste paper in the Chicago district are announced for the month of August, and show no change from the low levels established in July. Folded news is 40 cents per hundred pounds, No. 1 mixed paper 25 cents, and old corrugated boxes 35 cents, all f. o. b. Chicago in sales to mills. Nevertheless, there are signs of a stiffening tendency in old paper prices in some localities. The eastern market is firming on certain grades. Packers in New York and elsewhere in the East have adopted a collection curtailment program, which has cut down the supply reaching the market. An appeal has been made to Washington to declare an emergency exists under the waste paper code, and to permit the establishment of minimum sales prices. Moreover, consuming demand has increased to some extent, and all of these factors have been creative of a stronger tone in prices. New York reports folded news selling at 35 to 40 cents per hundred pounds f. o. b. that city, No. 1 mixed paper at 20 cents, old corrugated boxes at 40 cents, heavy books and magazines at 60-65 cents, No. 1 old kraft at 1.00 to 1.05 cents a pound, No. 1 hard white shavings at around 2.10 cents a pound, and No. 1 soft white shavings at 1.85 cents. Dealers in the East are said to be evincing much less eagerness to sell than in some time, expecting higher prices and apparently satisfied to await market developments.

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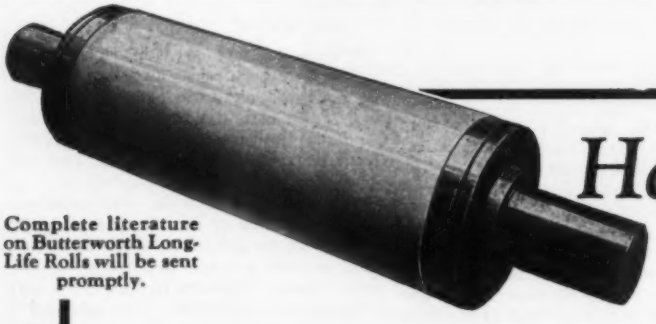

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BUTTERWORTH *Calender* ROLLS

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

Trade in imported wood pulp is near to a standstill. Pulp importers and agents, almost without exception, report paper and board manufacturers manifesting very little interest; that is, to a degree of actually placing orders for pulp, and offerings put before consumers seldom bring forth the response desired by sellers. Apparently papermakers in a large majority of cases have their raw material requirements provided for over a time, and are not keen about adding to their stocks or commitments just at present. They appear more concerned with matters in relation to their own markets than with augmenting raw material supplies pending a more definite idea of what they are likely to need over the coming months. Consequently, it is a difficult task to induce paper manufacturers to engage in pulp purchases currently.

Despite the dull condition of the market, the price tone is steady and quoted rates are fully sustained on established levels. No one is digressing from these price bases, and just what the future holds with respect to prices is problematical and a subject on which members of the trade are divided in opinion. Consumers seem to feel there is small likelihood of higher prices over the near future, if for the balance of this year, and doubtless this is a cardinal reason most of them are holding so steadfastly aloof as buyers at present. However, many in the trade are confident established prices will be maintained for an indefinite period, and support their view by pointing to the expressed unwillingness of producers abroad to sell at lower levels. On the other hand, there are those who are of the belief that unless the market picks up in activity, it will be difficult to sustain prices on prevailing bases.

Information from primary sources in Europe is rather slim. From most accounts, pulp mills in Scandinavia and elsewhere on the other side of the Atlantic are well sold up for the remainder of this year. Some mills are said to be completely sold out for 1934, and in at least certain instances, contracts for next year have been made. The European producers contend that present prices are not high and that they net them only a moderate manufacturing profit; moreover, they emphasize that the stabilization of the market is of great help to paper manufacturers in the United States, since firm raw material prices prevent unnecessary and disconcerting fluctutations in finished paper and board.

Prime bleached sulphite is quoted at 2.75 cents upwards per pound ex dock American Atlantic seaboard, some grades being held at 2.90 cents and up to 3 cents, and even higher. Strong prime unbleached sulphite is 2.10 to 2.20 cents ex dock basis, and easy bleaching and Mitscherlich sulphites 2.25 and 2.30 cents. Prime Scandinavian kraft pulp is around 1.85 cents, with purchases reported feasible at 1.80 and perhaps down to 1.75 cents, though with extra mill brands quoted at 1.90 cents and more. Prime foreign groundwood is available at $25 per short ton for dry ex dock Atlantic seaboard. In some cases, sellers are exerting at least a little pressure to dispose of groundwood, and it is said to be possible to shade asked prices.

Imports of pulp into the United States in May showed an increase compared with the preceding month and also contrasted with the same month last year. The May importations totaled 112,041 long tons of chemical pulp, valued at $4,512,612, according to U. S. Department of Commerce figures, against 68,884 tons of a declared value of $3,118,428 in April this year, and 73,376 tons of a value of $2,571,535 in May a year ago.

◆ Paper Stock

Imports of papermaking rags into the United States in May last amounted to 10,159,072 pounds of a declared value of $153.153, according to official U. S. Department of Commerce figures, showing a decline from the 13,043,114 pounds of a value of $124,230 imported in the preceding month, but a large gain over the 6,008,327 pounds of a value of $30,756 in the same month last year. Imports during the first five months of this year reached 45,215,920 pounds, valued at $557,003, contrasted with 23,653,376 pounds of a value of $168,579 in the same time of 1933. Miscellaneous paper stock imports, including old rope, bagging, waste paper, etc., amounted to 5,433,258 pounds of a value of $75,936 in May last, against 6,817,755 pounds of a value of $65,290 in the similar 1933 month, and making a total for the first five months of the current year of 26,955,713 pounds of a value of $405,064, compared with 28,489,845 pounds of a value of $275,741 in the same period of 1933.

◆ Paper

Imports of paper into the United States this year are running ahead of a year ago, in point of total value. Receipts during May last amounted in value to $7,935,237, compared with $7,567,345 in the preceding month, and $6,890,913 in May last year, making a total for the first five months of 1934 of $33,880,137, contrasted with $28,216,842 in the similar period of 1933. Newsprint comprised the major portion of the imports in May last, amounting in value to $7,117,827, against $6,182,719 in the same month a year ago, and totaling $29,584,360 for the first five months of the current year, compared with $25,256,992 in the similar time last year. Next in importance was cigarette paper, imports of which were valued at $331,343 in May this year, against $280,812 in May, 1933.

EXPORTS

For the second consecutive month, exportations of paper from the United States in May showed a decrease in total value compared with the preceding month, but continued to register an appreciable gain over the value of shipments in the corresponding 1933 month. Official U. S. Department of Commerce figures put total exports of paper and paper products from this country at a value of $1,456,078 during May last, contrasted with $1,574,681 in the month before, and $1,102,063 in May, 1933, and bringing the aggregate for the first five months of the current year up to $7,525,751, compared with $5,410,893 in the same period a year ago.

Exports of newsprint in May amounted to 3,388,450 pounds of a value of $73,147, against 1,245,636 pounds of a value of $30,503 in the similar 1933 month, while shipments of uncoated book paper were 1,014,914 pounds of a value of $58,258, compared with 1,206,287 pounds of a value of $50,707 last year. Wrapping paper exports in May were valued at $102,577, against $73,460 in the same month last year, and writing paper exports were valued at $95,868, compared with $69,979 a year ago. Tissue and crepe paper exports were valued at $44,174 in May, against $42,223 last year; of toilet paper, $46,588, against $47,938; of sheathing and building paper, $19,196, against $18,369; of blotting paper, $9,950, against $6,420, and of surface-coated paper, $65,229, against $39,155.

Boxboard exports in May were valued at $116,392, compared with $120,418 in the same month last year, and of other paperboard $56,039, against $50,954. Paper bag shipments reached a value of $53,973, contrasted with $44,592 in May last year, and of paper boxes and cartons, $54,077, against $38,034 a year ago.

Exports of paper base stocks from the United States amounted in value to $496,955 in May last, of which total sulphite wood pulp comprised $303,241, compared with a total value of $275,126 in May, 1933.

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